THE IRON AGE

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Forms of a Foundry Cost System

Outline of the Method of Determining the Cost of Castings, Cores, Etc., at Plant of the Ferro Machine & Foundry Company, Cleveland

A complete foundry cost system that has been gradually developed to meet the needs of that company to provide accurate records of foundry costs and operations is being used by the Ferro Machine & Foundry Company, Cleveland, Ohio. This system starts with a daily metal report or charge sheet, Fig. 1, containing blanks for filling in car numbers and quantities of pig iron and other materials that go into the cupolas and air furnace. This daily report is made out by the chemist who has charge of the charging floor. Place is also provided on this report for an analysis report made by the chemist of each car of iron. The chemist sends duplicates of this report to the office and to the foundry superintendent.

From the daily metal report a monthly cost sheet, Fig. 2, is compiled showing the total cost of all iron charged during the month. To the cost price of this iron is added the freight charges, the cost of unloading and the cost of delivering the iron in the cupolas. This sheet shows the quantity, price, total cost and price per pound.

From the total charge deductions are made for scrap iron, defective castings and loss in melting, the waste being figured at 7 per cent. Making these deductions the balance shows the quantity and cost of good castings. A further deduction of the foundry cost gives the total cost per pound. Blanks are also provided on this report for the cost of producing different types of castings and for comparative cost and percentage statements, the comparison being made in any other desired period. The amount of pig iron and steel scrap on hand at any time is shown on the standard stock report.

A complete record of the work of each man in the foundry is kept in a daily foundry report or molding sheet, Fig. 3. During the forenoon the time-keeper gets from the molders the number of molds they are to make and the number of ladles they will require, then estimates the total heat required for the day and makes a report to the chemist as to how large a heat should be provided for the day. In the afternoon after pouring-off time the time-keeper fills in the number of molds each man has actually made. He then fills in the report with each molder's wages, if working piece work, or the number of hours if working by the day. He also fills out the blanks showing the number of pieces in a mold and the number of pieces cast.

During the morning the time-keeper makes out a discount report, Fig. 4, and sends it to a sorter or inspector. This discount sheet contains the molder's name, the firm name for which casting is being made, the article, pattern number and number of pieces that were made. At the completion of the day's work the sorter fills in the number of good castings, scrap castings, broken castings and weight per piece. This report is returned to the time-keeper who is thus provided with the information to fill in the daily foundry report as to the number of broken and scrap castings. The helper's time is also added to the cost of molding. After the discount report is filled out it is hung in the foundry so that each molder may know what the inspector has reported.

THE FERRO MACHINE & FOUNDRY CO.

CLEVELAND, OHIO

METAL REPORT Date Jan. 26 1912

CUPOLA REPORT

MATERIAL	CAR NO.	WEIGHT	SOFT HEAT WEIGHT	SPECIAL HEAT WEIGHT
No. 2 Pig Iron	P.R.R. 45000 P.L.E. 183124	30000	20000	10000
% Pig Iron		4000	3000	1000
Steel Scrap		500	400	100
Scrap Iron		48200	40000	8200
Coke		21300	18000	3300
Limestone		3500	3000	500
MANGANESE		340	300	40

Transverse Test 3000#

Deflection 14 in.

Piston Ring Test 23

AIR FURNACE REPORT

MATERIAL	CAR NO.	WEIGHT	REMARKS
No. 2 Pig Iron	P.R.R. 45000 P.L.E. 183124	14500	
% Pig Iron		6000	
Car Wheels		6000	
Steel Scrap		1800	
Scrap Iron		4000	
Coal		10000	

Transverse Test 3200#

Deflection 13 in.

ANALYSIS REPORT

Car No.	Si	S	P	Mn	GC	TC	Car No.	Si	S	P	Mn	GC	TC
45000	2.25	.021	.450	.68	2.98	3.52	183124	8.12	.04	.35	.49	2.75	3.50

Fig. 1—Daily Metal Report or Charge Sheet. Size About 5x7½ In.

In the foundry cost card, Fig. 5, is shown the estimated and actual metal cost, core cost, molding cost and the percentage of overhead charge. From these figures which are taken from the daily foundry report the actual cost can be quickly ascertained. The actual metal cost is of course obtained from the unit cost given in Fig. 2.

When an order is sent to the foundry superintendent a stenographer makes out the foundry production order, Fig. 6. Duplicates of these orders, on different colored papers, go to the cost department, pattern clerk, core room and shipping department, the one going to the shipping clerk having place for filling out the record of shipment. By means of these orders the clerk in charge of the foundry cost card is able to check against the shipping clerk. The duplicate going to the pattern clerk notifies him to have pattern sent down to the foundry. The order to the

The Ferro Machine & Foundry Co., Cleveland, Ohio

Cost of Producing Iron in Cupola for Jan. 1912

MATERIAL	Pounds	Price	Amount	Price per Lb.
Pig Iron	1375675	1483 NT	9107.33	
Home Scrap	1205550	1050 NT	6329.14	
Steel Scrap	59775	12.75 NT	380.91	
TOTAL CHARGE	2587200		15817.38	
DEDUCTIONS				
Scrap Iron	660280	10.50 NT	3466.47	
Defective Castings	375300	10.50 NT	1970.33	
Loss in Melting	181104			
TOTAL DEDUCTIONS	1216684		5436.80	
Good Castings	1370516		10380.58	
FOUNDRY COST				
Labor			475.50	
Fuel	5500.50	NT. 4.75	1141.35	
Stores	9300.00	NT. 1.10	51.15	
	9500	9.7.45	190.85	
Metal	1370516		10380.58	
TOTAL COST PER POUND			12239.43	
DISTRIBUTION OF METAL				
Cost of Producing Cylinder Castings	830048		7411.276	
Cost of Producing Cored Castings	300418		2682.88	
Cost of Producing Plain Castings	240050		2143.79	
Home Scrap	1216684		5436.80	
To Cost of Producing Iron in Cupola	2587200		17676.23	

Comparative Cost Statement

	Jan 1912	Dec 1911	Nov 1911	19	19	19
Labor	0347	.0343	0350			
Fuel	0833	.0822	0840			
Stores	0176	0196	0187			
Metal	.7574	.7887	.7765			
TOTAL COST cwt.	.8930	.9248	.9142			

Comparative Percentage Statement

	Jan 1912	Dec 1911	Nov 1911	19	19	19
Scrap Iron	.2552	.2425	.2602			
Defective Castings	.1451	.1427	.1430			
Loss in Melting	.0700	.0700	.0700			
TOTAL LOSS	.4709	.4552	.4732			
Good Castings	.5297	.5448	.5268			
TOTAL PRODUCT	1.0000	1.0000	1.0000			

Fig 2—Monthly Cost Sheet, Yellow Loose Leaf Sheet, 8½x13¾ In.

THE FERRO MACHINE & FOUNDRY CO.

DAILY FOUNDRY REPORT FOR Jan 29 1912

Form No. S. 134-1-12

Ladle	Our No.	Pattern No.	MOLDER	Molds	Scrap	Broke	Good	Total	Price per Mold	Weight	Total Wgts	Pieces in Mold	Pieces Scrap	Weight	Broken Pieces	Weight	Good Pieces	Weight Castings	Leak	Weight	Cost of Core	Cost of Molding
9	2346	X 23	J Jones	10	4		6		50		500	1	4	180			6	270			470	500

Fig. 3—Daily Foundry Report or Molding Sheet. White Paper, Ruled in Red and Blue; 13¼ In. Wide and 22 In. Long.

The Ferro Machine & Foundry Co., Cleveland, Ohio
DISCOUNT REPORT

Jan. 29, 1912

Floor	Molder	Firm	Article	No. Pattern	No. Pieces	Good Molds	Scrap Molds	Broken Molds	Weight per Piece
3	J Jones	John Doe	Cylinder	X 23	10	6	4	—	45

Fig. 4—Discount Report Made by Timekeeper. White Paper, Ruled in Red and Blue; 8½ In. Wide and 18 In. Long.

THE FERRO MACHINE & FOUNDRY CO.
CLEVELAND, OHIO

FOUNDRY COST CARD

Order No. 2340
Pattern No. X 23

Name John Doe Address Det Mich Date 1/26 1912

DATE 1912	THEIR ORDER NO.	NO. PIECES	DESCRIPTION	DATE 19...	THEIR ORDER NO.	NO. PIECES	DESCRIPTION
1/26	3500	10	Cylinders				

FOUNDRY COSTS

ESTIMATED COST

DATE 1912	REMARKS	PER CENT. SCRAP	WEIGHT	METAL COST	CORE COST	MOULD COST	OVERHEAD
			448	43	46	45	

SHIPMENTS

DATE 1912	PIECES	WEIGHT
1/30	6	270

SHIPMENTS

DATE 19...	PIECES	WEIGHT

RETURN TO FOUNDRY

DATE 1912	PIECES	WEIGHT
2/3	1	145

ACTUAL COST

DATE 1912	MADE	DEFECTIVE	GOOD	WEIGHT	METAL COST	CORE COST	MOULD COST	OVERHEAD
1/29	10	4	6	270	241	470	500	506

Fig. 5—Foundry Cost Card. Manila Card, Ruled in Red and Blue; 7x10 In.

core room notifies the foreman that the order is ready to run and the number of cores required.

Each core maker is provided every morning with a card, Fig. 7, on which are printed rows of numbers from 1 to 335. On this card there are blanks for clock number, pattern number, rate of earnings and core box number. When the core maker starts to work the time-keeper stamps the time on a card with a Calculagraph. When the core maker brings cores up to the oven to be dried the time-keeper punches on his card the number of cores that he has. When the day's work is completed this card shows the number of cores each man has made and the time he has put in. These individual core maker's cards furnish data for the core cost card, Fig. 8, and the core costs are transferred to the daily foundry report.

A return casting report, Fig. 9, shows the number of pieces returned by customers and the cause of defects. With the data on the return casting report the filling out of the foundry cost card can be completed and the in-

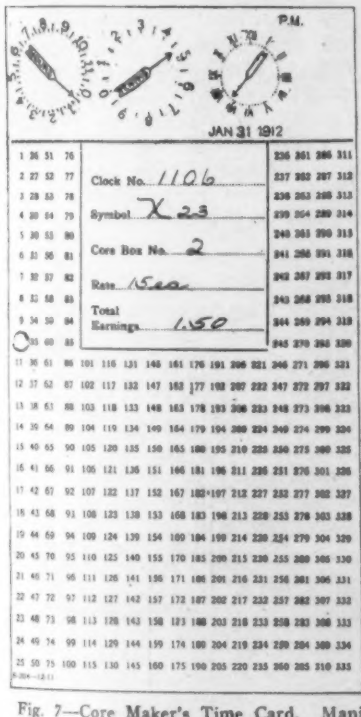


Fig. 7—Core Maker's Time Card. Manila Card, 4¼x7¾ In.

THE FERRO MACHINE & FOUNDRY CO.
FOUNDRY PRODUCTION ORDER

Their Order No. 3500 Our Order No. 2340
Ship Via EXPRESS Date 1-26-12 19

COST DEPT.

Name John Doe Pattern No. X-23
Address Detroit, Mich., Article Cylinder
Pieces Ordered 10 (Ten) Price
Instructions R U S H

Approved:-

REMARKS

Fig. 6—Order Sheet Sent to Foundry Superintendent, Cost Department, Pattern Clerk, Core Room and Shipping Department; 5½x7½ In.

THE FERRO MACHINE & FOUNDRY CO.
CLEVELAND OHIO

CORE COST CARD

Job No. 4550
Customers No. 3500 Article Cylinder casting Order No. 2340
Symbol X 23 Quantity 10 Rush Blue Print No. 25

Box # 1 - 2 cores				# 2 - 1 core				# 3 - 1 core				# 4 - 1 core			
Date 1912	Finished Pieces	Value	Average Cost	Date 1912	Finished Pieces	Value	Average Cost	Date 1912	Finished Pieces	Value	Average Cost	Date 1912	Finished Pieces	Value	Average Cost
1/27	20	60	03	1/27	10	150	15	1/27	10	180	18	1/27	10	80	08

Fig. 8—Core Cost Card Furnishing Information for Daily Foundry Report. Manila Card, Ruled in Red and Blue; 7x10 in.

formation contained in these reports is transferred to the foundry monthly cost card, Fig. 10, which shows at a glance the comparative monthly foundry costs.

THE FERRO MACHINE & FOUNDRY CO.
CLEVELAND, OHIO
RETURN CASTING REPORT

Name John Doe Date 2/8 1912

CREDIT ALLOWED FOR	NO. PCS.	SYMBOL	ARTICLE	CAUSE OF DEFECT
45#	1	X23	Cylinder	Blow holes in bore

Fig. 9—Report Blank for Returned Defective Castings. Pink, 5¼ x 7¾ In.

B. 152 THE FERRO MACHINE & FOUNDRY CO. CLEVELAND, OHIO

FIRM John Doe Pattern No. X23
ARTICLE Cylinder Weight Each 45#
Unit ea

FOUNDRY MONTHLY COSTS

	1911			1912			1913			1914			1915		
MONTH	COST	% O. H.	METAL	COST	% O. H.	METAL	COST	% O. H.	METAL	COST	% O. H.	METAL	COST	% O. H.	METAL
JAN.				331	80	89									
FEB.															
MAR.															
APR.															
MAY															
JUNE															
JULY															
AUG.															
SEPT.															
OCT.															
NOV.															
DEC.															

Fig. 10—Card for Keeping Costs for Different Products. Manila Card, Ruled in Black; 4x6 In.

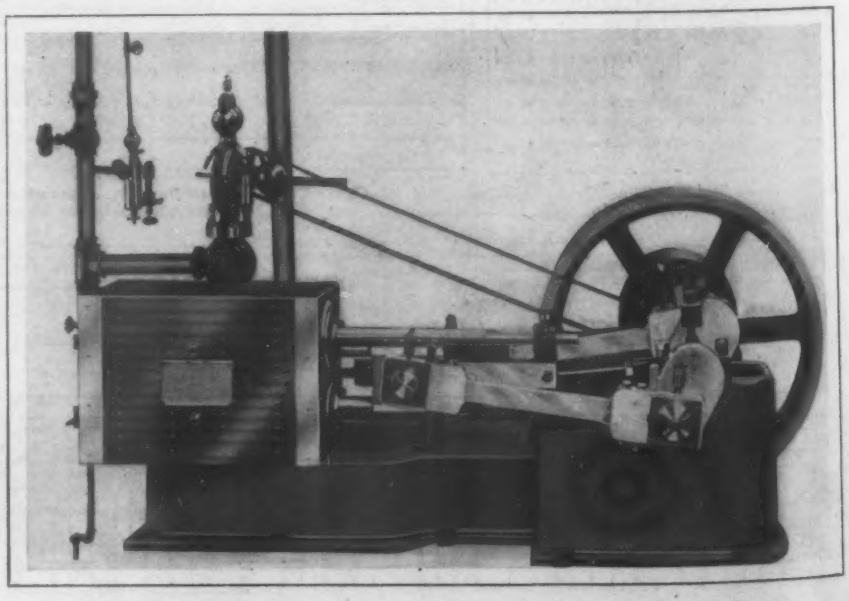
A Headless Steam Engine

A Prime Mover with Two Cylinders Each Containing Two Pistons with the Steam Working Space Between the Pistons

A steam engine with two cylinders, each cylinder having two pistons working in opposite directions with an arrangement for accepting the steam in the space between the pistons, has been patented by J. A. Dowling, Biloxi, Miss. The outside view of the engine, as built by the Dantzler Foundry & Machine Works, Gulfport, Miss., is shown in the accompanying illustration. The two pistons are connected to cranks placed 180 deg. apart. The pistons travel from each other a distance of 18 in., and while one pair of pistons is traveling outward, utilizing the power of the steam admitted, the others approach each other exhausting the steam. The steam thus enters and exhausts alternately from each cylinder. The engine is of the throttling type with plain slide valve and ball governor on the main steam pipe. The two cylinders are each 6½ in. in diameter and the cranks have a 4½-in. radius.

Mr. Dowling has supplied a record of a test run at the plant of the Audubon Ice Mfg. Company, conducted by Wm. J. Tierney, New Orleans, La. It is stated that with saturated steam at 135 lb. and a speed of 310 r.p.m., 62.25 indicated horsepower was obtained with one-third cut off, and the steam consumption was 30.6 lb. per horsepower hour. It appears that the tests were made without bolting the engine to a foundation, this fact being offered to indicate successful balancing and freedom of vibrations of the engine.

As stated the steam is used between the two pistons reciprocating in a headless cylinder. The point is emphasized that the energy otherwise lost through the cylinder heads is eliminated. A solid drawn piston rod passes through a tubular piston rod, this allowing for the alternating movement of the pistons with respect of each other. The solid piston rod of one cylinder is connected with the tubular piston rod of the other cylinder by means of one of two cross heads which there are, the two arranged to pass each other by the tubular rods being slotted. When the pistons in the upper cylinder, for example, reach the end of their outward stroke, the pistons of the lower cylinder reach the end of their inward stroke. The steam chest is located on one side between the two cylinders and the steam is admitted to the interior by means of ports at the middle. The open end of the cylinders are closed by suitable covers to exclude dust and other material from the interior of the cylinders. As the engraving shows, the engine differs in appearance from the ordinary slide valve engine in the use of the two cranks. The crossheads as indicated reciprocate on a level with the main shaft, but, of course, are midway between the levels of the centers of the two cylinders. There are, of course, only two working strokes per revolution as in the ordinary engine.



Steam Engine Having Two Cylinders Without Heads and Each Containing Two Pistons

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The Firth-Sterling Steel Company, for which E. S. Jackman & Co. are agents, has issued a circular calling the attention of tool steel consumers on the Pacific coast to the stock of steel which it is now carrying in San Francisco. This comprises a full assortment of rounds, squares, flats and octagons. Orders for Firth-Sterling Special tool steel are, however, taken in San Francisco subject to delay, owing to the heavy demand for this steel in other markets of the country. Each order is given its place, to be filled as soon as possible.

Burnishing with Steel Balls

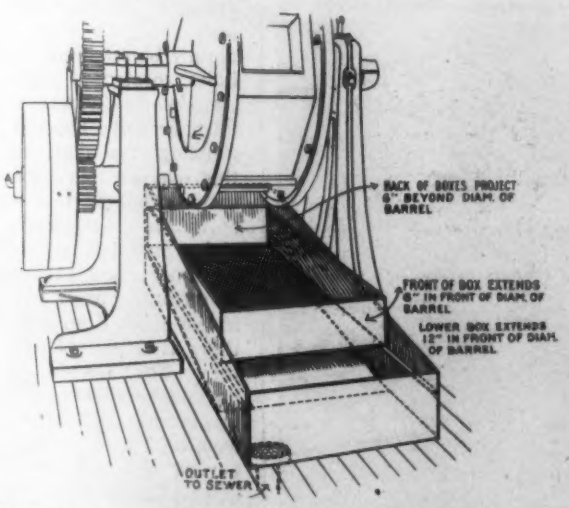
The Method Employed by the Abbott Ball Company

The method of burnishing with steel balls employed by the Abbott Ball Company, Hartford, Conn., is the application of the hand burnishing principle to machine work. The working end of the hand tool must be very hard and finished smoothly, and this pressure against the work, in conjunction with the lubricant or soap mixture, produces the highly polished surface. With the machine the steel balls must be very hard and smooth. With a sufficient quantity of them, combined with a soap mixture or burnishing compound in a properly shaped tumbling barrel, the rotation of the barrel causes them to slide over and under, in and out about the work, their weight giving the effect of a hand tool. In this way hundreds or thousands of pieces are burnished at one time, instead of a piece at a time, as with the old method. Nothing requires renewing, excepting the burnishing soap, the cost of which is about 2 cents for a peck to a bushel of work. Each lot requires two or three pails of water.

The theory is that the shape of the barrel, seen in the illustration, with a given bulk of steel balls, makes a high pile concentrating the weight on the work at the bottom of the barrel, which consequently creates the necessary pressure. Each individual unit of several hundred thousand balls is an individual burnishing tool. The shape of the barrel also avoids the tendency of carrying the contents high on the inside surface, which lets the load drop back, bruising and marring the required finish of the work.

The steel balls are selected for the work to be finished. If it presents a perfectly plain, smooth surface the larger sizes may be used to advantage to secure a good finish at a low cost. If, however, the work has a figured surface or small corners and crevices, the balls must be small enough to get into these places. It has been demonstrated that the smaller they are the better and quicker the results.

Making a comparison of 1/16 and ¼ in. balls, when using ¼ in. balls, there will be 16 points of contact between the balls and the surface of the work in a square inch of surface, whereas, if 1/16 in. balls were used, there would be 256 points of contact. It is self-evident that quicker work will be done by the smaller balls, with better results. In some cases it is desirable to use a mixture of two or more sizes so as to reach the small corners of the work and at the same time secure a sufficient weight without the attendant high cost for the smaller balls.


BACK OF BOXES PROJECT 6" BEYOND DIAM. OF BARREL
FRONT OF BOX EXTENDS 6" IN FRONT OF DIAM. OF BARREL
LOWER BOX EXTENDS 12" IN FRONT OF DIAM. OF BARREL
OUTLET TO SEWER

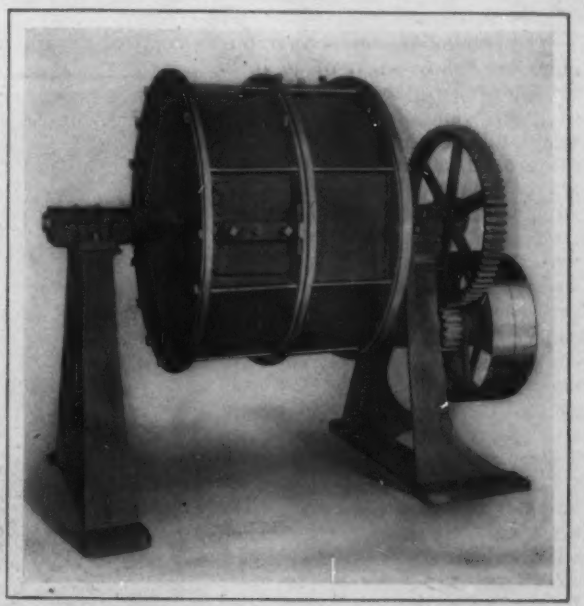
Box Device for Unloading a Burnishing Barrel without Losing the Steel Balls.

The upper box is arranged to slide on cleats, so that when the contents of the barrel are dumped into it the balls are riddled through the bottom, which is of netting of mesh coarse enough to allow the balls to pass through, but not the work. Then the upper box containing the work can be removed, and the balls can be shoveled from the lower box into the barrel again ready to use.

In regard to the quantity of balls required for good burnishing, as it is the rubbing effect of the balls that produces the high finish on the work, it is evident that a sufficient weight must be used in order to create the pressure. Burnishing means rubbing under pressure. It is also necessary to use enough balls to keep the work separated while tumbling in the burnishing barrel, for if the pieces are not kept apart they will bang together and mar and bruise each other.

The usual method is to use two pecks of balls to each peck of work that is to be treated. However, this may be varied to some extent on different classes of work. To the balls are added enough water to stand about one inch above the contents, and about 4 oz. of soap in the form of chips. It is preferable that the soap chips be dissolved in hot water before being put into the barrel.

The rolling is carried on 1 to 5 hr., depending upon the character of the work. The softer the metal, the shorter the time required to finish it. The operator may easily determine the time by an inspection of the work. If, after the rolling has been carried on for a short time, it is found that the work has a dull or smutty appearance the contents of the barrel should be emptied and fresh water and soap put in, together with a piece of cyanide about the size of a bean. It is imperative that the barrel, balls, work and solution be kept very clean and free from dirt or foreign substances at all times.



The Abbott Burnishing Barrel for Use with Steel Balls

The operation is carried out on work that is either to be left in its original condition or is to be plated. In other words the articles are rolled both before and after plating. The operation is the same, irrespective of the kind of metal. If the work is not to be plated it is taken directly from the barrel and dried in clean hard wood sawdust, preferably in a hot sawdust box, or if the pieces are of a nature to stand it, they can be placed in a tilting barrel with sawdust and tumbled a few minutes to dry. If the work is to be plated, it can be taken from the barrel and cleaned in the usual manner, and after plating returned to the burnishing barrel with a fresh solution and steel balls for the final finish, which requires about half an hour.

The soap mixture used with the steel balls is very important. Ordinary soap may stain the work and attack the steel balls on account of its salt or other corrosive elements. Mild soap is best because it will not attack the metal. There are several burnishing compounds manufactured for special use with steel balls.

Small light articles will stand faster speed than heavier articles, the variation being from 10 to 30 r.p.m. for ordinary classes of work. The usual speed is 15 r.p.m.

The Brown-Ketcham Iron Works plants at Indianapolis, Ind., and Greensburg, Pa., have been turned over to the purchaser, the Noelke-Richards Iron Works, Indianapolis, by the trustee in bankruptcy, Frank L. Stalnaker, the sale having been approved by the referee in bankruptcy. The Noelke-Richards Iron Works will move its headquarters from its former plant to that of the Brown-Ketcham Indianapolis plant. Two dividends have been paid the Brown-Ketcham creditors, making a total of 85 cents on the dollar.

Details of a Machine Erecting Shop

Additions to Works of the Birdsboro Steel Foundry & Machine Company, Including a Heating System with Underfloor Concrete Air Ducts

Increasing business, particularly in the way of heavy duty pumping machinery, has necessitated the providing of considerable additional facilities in connection with the plant of the Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa. The most important addition has been the new erecting shop, which embraces several improved features, both in connection with the building itself, as well as its equipment.

The building measures 64 ft. 6 in. x 122 ft. on the ground plan, and has a height of 40 ft. to the top of the crane runway. It is of steel frame construction, with brick walls extending 18 ft. from the ground, above which the walls are of cement plaster on expanded metal. Intermediate beams strengthen the expanded metal between columns. The cement walls are 2 in. thick, composed of two coats on each side of the expanded metal. The area of the window space is large, representing 25 per cent. of the full wall space. The roof is of 2 in. tongue and grooved yellow pine, on which a slag roofing is laid. A monitor 7 ft. 6 in. high, with windows on all sides, surmounts the roof. The floor has an 18 in. slag fill, on which chestnut sleepers are laid, 18 in. between centers, the space between the sleepers being filled with concrete. On these 2½ in. yellow pine planks are laid, which constitute the floor proper. A spur of standard gauge track from the railroad siding passes through one end of the building; this siding has a storage capacity of four or five cars and permits of moving cars to loading points without the necessity of calling on the railroad for shifting cars.

View in the Erecting Shop Showing End of Crane Runway from Machine Shop

View in Steel Foundry, Showing at Left the Loam Grinder, Toward the Right the Drying Ovens and in Background the Open Hearth Furnaces

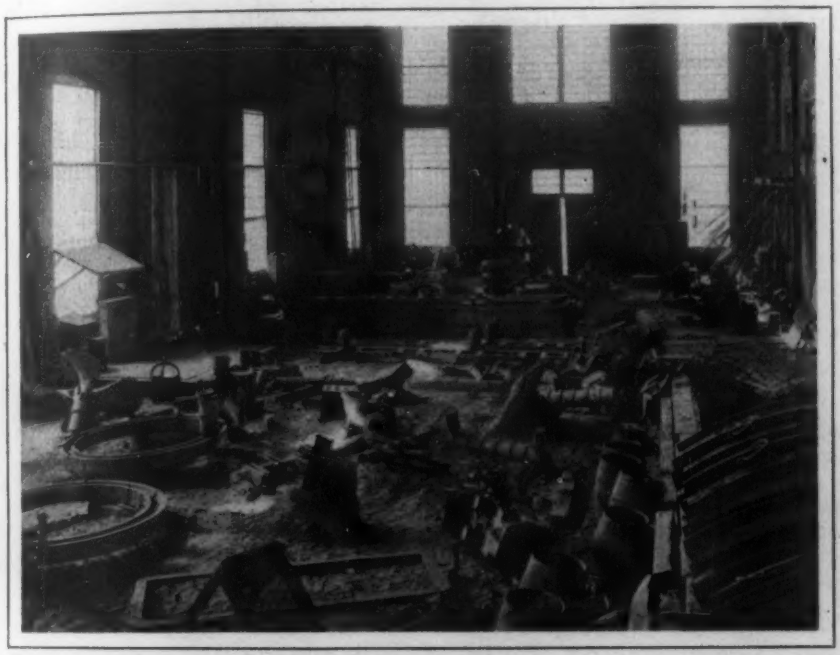
The American blower system, using exhaust steam, is used for heating, the main conduits being under the floor so as not to interfere in any way with the open space in the erecting shop. A concrete duct reinforced across the top and 38 in. in width and 36 to 39 in. in inside height, extends around the greater part of the shop, close to the foundation walls. From the duct terra cotta branches extend to sheet metal uprights, through which the warm air is blown into the shop. At a low point in the system a siphon trap is located in order that any water which might leak into the duct can readily be removed. Manholes located at convenient points with covers flush with the floor allow cleaning the duct when this may be found necessary. The air from the blower is deflected to the right and left into the two main ducts, extending in opposite directions and at the point of bifurcation there is a pivoted deflector. The upright heat ducts are generally 18 in. in diameter, of galvanized iron, with a pair of 10 in. curved deflecting tops or elbows, as shown in an accompanying view in the erecting shop. In the summer the same system is used for maintaining a current of fresh air in the building.

The equipment of the building consists of a 30-ton Morgan Engineering Company's crane of 60 ft. span, with a 10-ton auxiliary hoist. The runway of the general machine shop crane extends into the erecting shop and makes convenient handling of castings and machinery. The machine tool equipment of the erecting shop includes a 60-in. Cleveland open side planer, an 8-ft. Cincinnati boring mill, a 6-ft

Bickford radial, a Bauch multiple spindle, a Fifield lathe of 40-in. swing with a 34-ft. bed and a special boring lathe of 42 in. swing with a 40-ft bed.

An erecting stand, 30 x 7 ft., on concrete piers, on which I-beams support heavy cast-iron erecting tables, is located at one side of the shop. Directly in front of this is located a testing tank, which is placed beneath the floor. The tank is 42 in. in diameter and 30 ft. long and on the top are 20-in. square manholes, spaced 12 in. apart for allowing the use of any desired section of the tank. Adams-Bagnall flaming arc lamps are used for illumination.

Another addition which the Birdsboro Steel Foundry & Machine Company has recently completed is a flask storage yard, served by a 10-ton crane, of 40-ft. span, on a runway 200 ft. long, with 27 ft. head room. This handles flasks directly from the steel casting foundry floor, and also serves to handle sand from the main storage bins to smaller supply bins adjacent to the foundry floor.



Cleaning Room Extending from Steel Casting Department and Showing Annealing Furnace

The company operates both steel and gray iron foundries for rolling mill machinery and blast furnace castings in addition to general machine shops, and makes special hydraulic and other machinery, the Aldrich pump and also the Jackson belt lacing machine and diamond core drills for mine work. The steel casting plant is served by two acid open hearth furnaces of 20 to 30 tons capacity, enabling it to make castings up to 75,000 tons each. In the iron foundry both cupola and air furnace castings are made. Large loam castings are one of its specialties, as are also hydraulic castings. Its machine shop is equipped, among other tools, with some of the largest planers and boring mills in the East. The company emphasizes further that it is the only foundry east of Pittsburgh that operates its own blast furnaces, iron foundry, steel foundry and machine shops. Between 700 and 800 men are employed. The capacity of the foundries is in excess of the machine shop requirements and castings are sold in the rough.

View in the Iron Foundry of the Birdsboro Steel Foundry & Machine Company

The American Iron & Steel Mfg. Company

The twelfth annual report of the American Iron & Steel Mfg. Company, Lebanon, Pa., gives the following condensed balance sheet as of December 31, 1911:

Assets.

Cash	$1,100,388.66
Bills receivable	none
Accounts receivable—net	461,913.59
Inventory	1,281,318.99
Insurance and taxes, unexpired value	4,760.28
Real estate, plants and equipment	5,920,662.07
Less allowances to provide for depreciation	880,000.00
Total	$7,889,043.50

Liabilities.

Wages—accrued, not due	none
Accounts payable	none
Preferred stock	$3,000,000.00
Common stock	2,550,000.00
Undivided profits, subject to payment of dividends, payable January 1, 1912	2,339,043.50
Total	$7,889,043.50

President James Lord says: "As in the previous year, prices continued to decline, without any recovery, throughout the year. During the year a special dividend of 2 per cent., amounting to $11,000, was paid in addition to the regular dividend of 5 per cent. Additions were made to plants and equipment amounting to $129,026.45."

The directors for 1912 are: Edward Bailey, Horace Brock, John W. Brock, B. Dawson Coleman, Edward R. Coleman, Thomas Evans, W. C. Freeman, James Lord, H. M. M. Richards, J. H. Sternbergh and H. M. Sternbergh.

The executive officers are as follows: James Lord, president; John Penn Brock, vice-president; H. M. M. Richards, treasurer; D. G. Scott, secretary. The executive committee consists of John W. Brock, Horace Brock, Edward R. Coleman and W. C. Freeman.

The regular monthly meeting of the Philadelphia Foundry Foremen's Association was held in that city on the evening of February 13. An interesting discussion led by James Whitehead took place on the subject of shop management. Electric welding also came up for discussion and will be made the subject of an address at the next meeting.

For Improvement in the Quality of Steel Rails

A Conference of Rail Manufacturers and Railroad Presidents in New York—President Farrell on the Railroads' Responsibility for Present Specifications

At the invitation of Chairman E. H. Gary, of the United States Steel Corporation, a conference lasting all day was held at the Railroad Club in the Hudson Terminal Building, New York, February 15, attended by presidents of important railroad systems and by presidents of steel companies engaged in the manufacture of rails. It is to be followed by other conferences, in the effort to secure co-operation in the improvement of rail quality, and meantime this matter is in the hands of a joint committee of the manufacturers and railroad presidents. The following statement was given to the press by Chairman Gary:

A Conference Committee Appointed

"A meeting of representatives of practically all the railroads of the country and representatives of the manufacturers of rails of the country was in session during the entire day. The meeting was called by Judge Gary to consider the subject of improving, if possible, the character and quality of rails. After a full discussion of the whole subject, in which nearly every one present participated, a committee, consisting of all the members of the Executive Committee of the American Railway Association and the presidents of the manufacturing companies was appointed to tabulate the data already obtained, to receive further information and to consider the subject and to report their recommendations at a future meeting to be called by the chairman of the Executive Committee.

"This committee consists of Presidents Willard of the Baltimore & Ohio, Loree of the Delaware & Hudson, and Mudge of the Rock Island, and Vice-President Kruttschnitt of the Harriman lines, and several other railroad officials. The manufacturing companies are represented by Presidents Dinkey of the Carnegie Steel Company, Buffington of the Illinois Steel Company, Schwab of the Bethlehem Steel Company, Clarke of the Lackawanna Steel Company, Wood of the Maryland Steel Company, Felton of the Pennsylvania Steel Company, Price of the Cambria Steel Company, Crawford of the Tennessee Coal, Iron & Railroad Company, and Farrell of the United States Steel Corporation.

"It was the unanimous sentiment that everything practicable should be adopted to secure a rail that is entirely safe. The committee will meet at a date to be fixed by Chairman Gary and President Willard, and a meeting will probably be held within a week or ten days."

The last series of conferences between representatives of the steel companies and the railroads, held in 1907 and 1908, was conducted by the engineering staffs rather than by the executives of the respective companies, as was the case last week. The previous conferences were concerned with questions of discard, drop tests, chemical composition and other details of metallurgy and testing. The intention now is to go thoroughly into the issues involved, the inquiry to include comparisons with specifications of European railroads. The American Railway Association's committee, which has been at work on the problem for several years, has gathered a vast amount of data which will be available in the work of the newly constituted joint committee.

The full list of members of the executive committee of the American Railway Association, all of whom are members of the joint committee referred to in Judge Gary's statement, is as follows:

Daniel Willard, president Baltimore & Ohio Railroad.

H. U. Mudge, president Chicago, Rock Island & Pacific Railway.

W. G. Besler, vice-president and general manager Central Railroad of New Jersey.

G. L. Peck, general manager Pennsylvania Lines West of Pittsburgh.

T. E. Clarke, general superintendent Delaware, Lackawanna & Western Railroad.

Fairfax Harrison, president Chicago, Indianapolis & Louisville Railway.

B. F. Bush, president Missouri Pacific Railway.

J. Kruttschnitt, director of maintenance and operation, Union and Southern Pacific systems.

H. E. Byram, vice-president Chicago, Burlington & Quincy Railroad.

L. F. Loree, president Delaware & Hudson Company.

A. W. Sullivan, formerly general manager Missouri Pacific Railway.

Stuyvesant Fish, director Missouri, Kansas & Texas Railway.

W. C. Brown, president New York Central Lines.

F. A. Delano, president Wabash Railroad.

President Farrell's Statement

Attention has been directed sharply to the matters at issue between the railroads and the steel manufacturers by the statement of President Farrell of the Steel Corporation made recently when he appeared before the Stanley Committee at Washington. Mr. Farrell made the point that "steel manufacturers to-day are druggists; they are dealing with prescriptions from the railroads." In so saying he added that "rails are not going to be any cheaper if the railroads continue to exact from the manufacturer the conditions of more discard—producing an ingot and cutting it in sections and throwing away the rest of it." In making it clear that the character of the rails produced in recent years has been largely determined by the railroads, Mr. Farrell said:

"The public demands, and rightly, that railroad transportation shall be safe and that rails shall not break. I am absolutely convinced that if the railroads are to accomplish this they must be prepared to face a greater wear of steel rails. In other words, under the severe and often unknown demands of modern railroad traffic, choice must be made between safety and wearing quality in steel rails.

"Beginning about 1890, the railroads of the United States began to ask for higher carbon in steel rails in order to secure greater wear; and the rail makers unwisely, and many times under protest, made the quality of steel demanded. Gradually the specifications called for still higher carbon, until to-day I believe the steel is within the danger zone of brittleness. The carbon is so high that we get the brittle rail.

"It is true that many of these hard rails never break, but the liability to breakage is much greater than in the old-time softer steel; and the influence of the unavoidable contingencies of manufacture, such as seams, pipes, and segregation, is much greater. In many respects the steel is more doubtful, more dangerous, and more treacherous. It is unquestionably, in my judgment, an unsafe grade of steel, in view of the severe conditions of service.

LOWER CARBON RAILS WOULD BE SAFER.

"If safety is to be the first consideration, lower carbon, softer steel would seem to be necessary. With such steel the various unavoidable defects or variations of commercial rails would be far less dangerous. Seams, pipes, and segregations would all be less dangerous. Less likely, also, to cause breakage would be the cold working in straightening, and the many contingencies of track and rolling stock would be less likely to cause breakage.

"The breakage of rails is frequently caused by improperly ballasted track, uneven bearings on cars, flat wheels, engine-driving wheels being out of round or badly worn, unbalanced driving wheels, center of gravity of engine too low, slipping of engine drivers, and prolonged low temperature.

"I believe I am correct in stating that harder steel is used in rails in the United States than in any other country, and yet our wheel loads and train loads are much greater than those on foreign roads. The British Board of Trade, which has authority in such matters in Great

Britain, would consider the high carbon used for rails in this country as dangerous, especially as our phosphorus, in Bessemer rails at least, is also higher than theirs.

MORE METAL IN THE SECTION.

"When, with increased weight of motive power and rolling stock, it became necessary to strengthen bridges, engineers did not try to do so by using a harder and higher tensile strength steel. They increased the amount of metal of the kind they had been using, because they knew they must have a safe steel and a large factor of safety.

"At the present time we are rolling some rails for the New South Wales Government, for which they are paying us $100 per ton, not $28. They are manganese steel rails, to be used on curves and grades.

"The engineers of railroads should not endeavor to overcome the increased wear of rails under modern conditions by using a rail that is so high in carbon that it is likely to be brittle. You might say that a soft rail would wear out more quickly. The old soft rails, under the conditions of their day, gave very satisfactory wear, and it is my belief that that wear would be less rapid than most people estimate; providing, of course, the section of rail is heavier. Instead of using an 80-pound rail with lower carbon, they might use a 90-pound rail—a heavier rail which would give more actual metal to be worn away before the rail becomes too weak.

"In my opinion the proper course for railroads to pursue is to use a heavier rail of softer steel, making safety the prime object, and getting the maximum wear they can under such conditions."

Coke Pusher and Coal Leveler

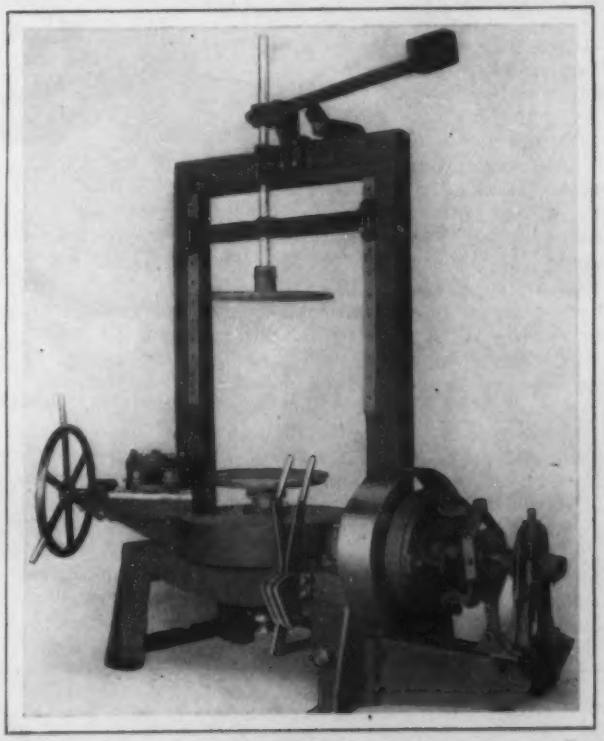
Four combined coke pushers and coal levelers have been recently built by the Alliance Machine Company, Alliance, Ohio, for the Koppers by-product coke oven plant of the Tennessee Coal, Iron & Railroad Company, at Cory, Ala. Novel features of design and construction are embodied in the machine, the most important of these being the placing of the coal leveler directly over the coke pusher ram and the arrangement of the cage so that the operator is directly over the pusher ram and under the coal leveler. This arrangement, it is pointed out, gives him a clear view and consequently command of both rams at all times, and as both rams are in the same vertical plane it is always possible to stop the machine in the same position relative to the oven when coke is being pushed out or a fresh charge of coal is being leveled. The system of bracing permitted by this construction gives a rigid machine and one that is said to be well adapted to stand all the shocks incident to the operation of this class of machinery.

The machine is driven by three alternating-current motors of the mill type, each of which is controlled by an individual street railway type of controller. The machine is built of steel and bronze throughout, the details of the machinery being worked out along the same general lines as that followed in the design of a modern steel works crane. Bronze-lined capped bearings are provided for all the shafts. The strokes of the pusher and the leveler ram are 58 ft. 6 in. and 48 ft. 6 in. respectively, the leveler being adjustable vertically for 3 in. on either side of its normal position. The total hight of the machine above the top of the rail is 24 ft. and the distance from center to center of the track rails is 30 ft.

A New Combined Coke Pusher and Coal Leveler Built by the Alliance Machine Company, Alliance, Ohio

Power Double Seamer

For double seaming the heads of drums and other sheet metal packages, the Niagara Machine and Tool Company, 639 Northland avenue, Buffalo, N. Y., has brought out a machine which it designates as its No. 9 special



A Special No. 9 Double Seamer Built by the Niagara Machine and Tool Works, Buffalo, N. Y.

power double seamer. In using this machine the heads must be previously stamped to the proper shape by a press and dies and the work to be doubly seamed is clamped between the top disk and the lower double seaming chuck, which is shaped to suit the work.

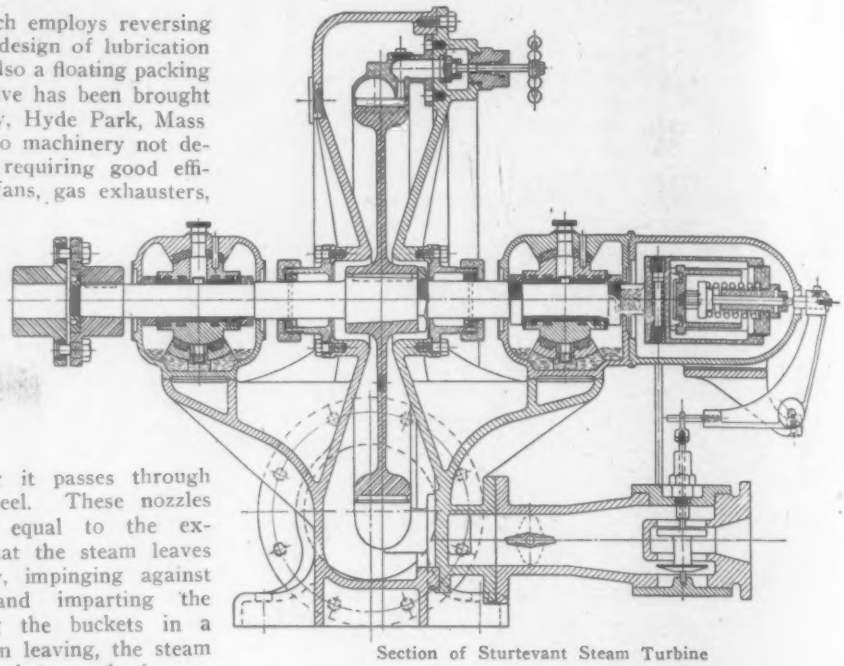
The double seaming chuck is driven by bevel gears and the spindle carrying it has an adjustable and thrust bearing. The carriage with the double seaming rolls mounted in a turret head is operated by a screw and a hand wheel. Either two or three rolls are used, according to the type of the seam and the thickness of the metal, which should not exceed No. 16 gauge, be less than 32 in. in diameter and 45 in. in hight. The motion is controlled by a friction clutch actuated by one of the hand levers at the right of the machine, and the other is used to lower the upper clamping plate, which is counter-balanced.

A New Sturtevant Steam Turbine

Reversing Buckets to Secure High Steam Efficiency —Improved Form of Rotor Buckets and Their Manufacture

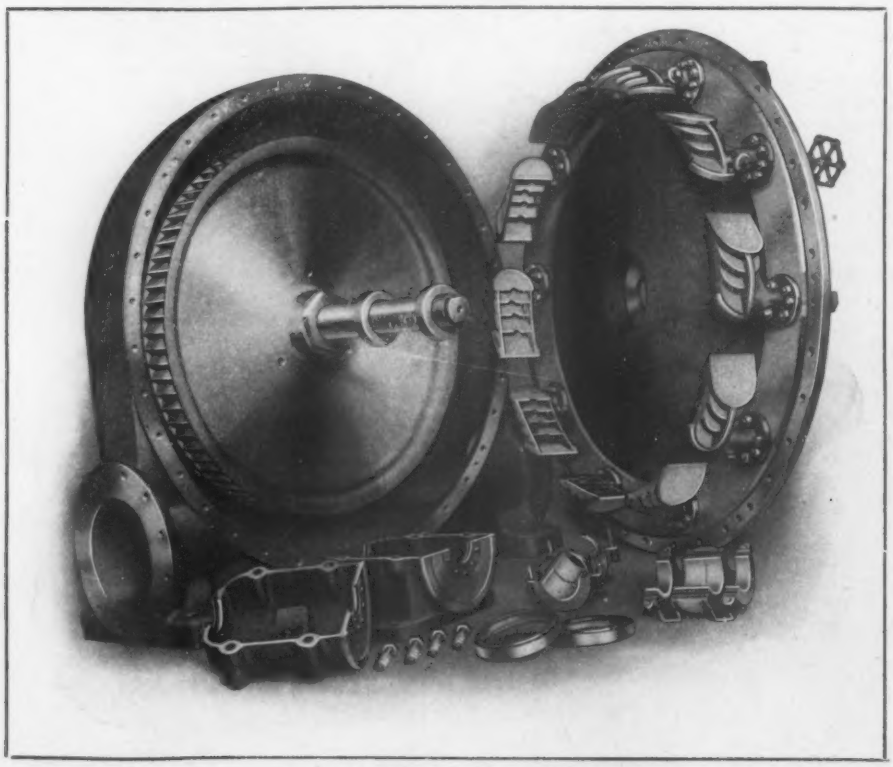
A new type of steam turbine which employs reversing steam buckets and introduces a new design of lubrication for the main bearings and which has also a floating packing box arranged to serve as a relief valve has been brought out by the B. F. Sturtevant Company, Hyde Park, Mass It is designed for direct connection to machinery not demanding relatively high speeds yet requiring good efficiency, such as blowers, ventilating fans, gas exhausters, mechanical draft installations, electric generators and centrifugal pumps. The accompanying illustrations will serve to indicate the main points of the turbine, but the details of the oiling scheme and of the floating packing box will have to be held for a later issue.

The steam enters an annular steam chamber in the casing of the turbine through a balanced throttle valve. From this chamber it passes through nozzles to the rotor or bucket wheel. These nozzles expand the steam to a pressure equal to the exhaust pressure in the turbine, so that the steam leaves the nozzles at a very high velocity, impinging against the semicircular rotor buckets and imparting the impulse to the rotor and leaving the buckets in a reverse direction to that of entry. In leaving, the steam enters the semicircular reversing buckets made in one piece with the nozzles. The action is to again reverse the direction of the steam and drive it back into the rotor. Thus the steam enters and leaves the rotor three times before its kinetic energy is absorbed and its velocity drops to nearly that of the rotor. It then passes out into the exhaust. In the drawing of the rotor and nozzle sections the vanes of the rotor straddle the edges of the nozzle. It has been demonstrated that when the steam from the nozzle enters the bucket it strikes the upper edge of the lip just entering the jet of the steam nozzle and the semicircular turn at the bottom and spreads out over the whole area of the bucket before making its exit. The speed of the steam being 15 times greater than that of the rotor the greater part of it has time to leave the bucket through the supplementary port or reversing bucket shown immediately below the nozzle section. From this port the steam is redirected into the rotor and the remainder enters the succeeding bucket shown just coming into the compass of the drawing. By this time the bucket mentioned has advanced so that the steam is next caught in the buckets alongside of and beyond the nozzle.



Section of Sturtevant Steam Turbine

The rotor is a solid forging of open-hearth steel, the buckets being of semicircular form milled into the rim. The method of cutting these buckets is of exceptional mechanical interest and is here shown. The cutter is a gear with cutting edges on the back of the teeth and driven by a similar gear, the work being done in an especially designed and patented machine. The former method, using an ordinary shank cutter necessitated the cutting away of a part of the bucket to give clearance for the shank, which necessarily weakened the rotor construction and was found to reduce efficiency. The new method cuts faster and also smoother, the peripheral drive being more powerful and resulting in no chatter. The rotor buckets are protected by the rim of the wheel, which is raised above them, and the construction of the wheel and stationary buckets is such that if by any chance they should come in contact none of the buckets would be injured. It goes without saying that the solid wheel is practically indestructible and danger of buckets working loose is eliminated.



View Showing Rotor and the Distributed Steam Nozzles Combined with Reversing Buckets

The Tobin bronze nozzles and reversing buckets are cast together in segments. The nozzles can be separately closed by hand valves on the exterior of the casing. When the engine is to be operated continuously on a light load one or more of the nozzles may be closed to secure economical operation. Where the demand for power varies widely this feature offers a distinct advantage.

The only parts requiring lubrication are the main bearings, which removes the possibility of oil in the exhaust

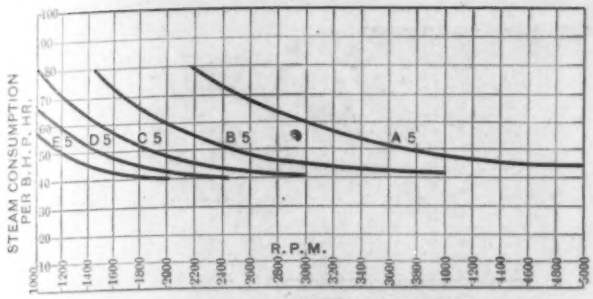
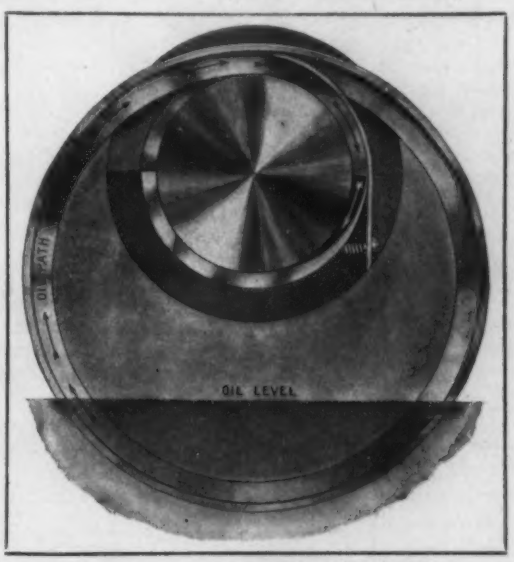


Chart of Steam Consumption of Turbine Operated Non-Condensing with Dry Steam at 125 lb. Pressure

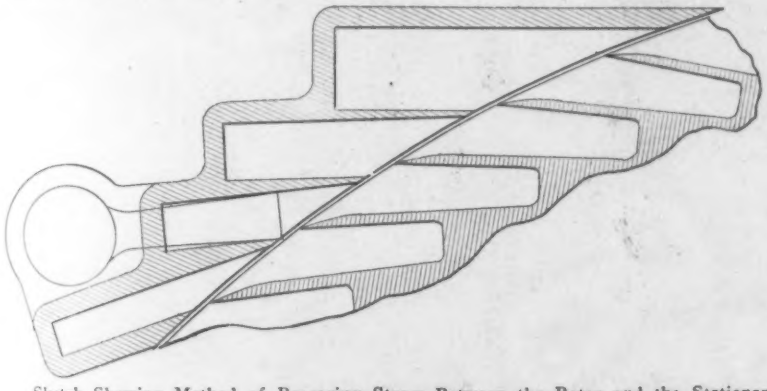
steam. This is, of course, an important point when the steam is to be used for heating systems or feed-water heaters. A channel oiling ring is used to obtain positive lubrication without the use of a pump. The oil is taken from the oil pocket by the rapidly revolving channel-shaped oiling ring, and is held within the ring by centrifugal force until it is diverted to the bearings by means of a scoop as shown in the illustration. The ordinary oiling ring, it is held, has a tendency to throw the oil from the bearings instead of concentrating it where it is needed. The channel scoop produces a positive pressure which forces the oil to the bottom of the bearing where the greatest pressure and consequent need of lubrication exists.

The speed of the turbine is regulated through a balanced throttle valve by means of a powerful governor of the centrifugal type. In addition to the main governor an emergency governor is set at a predetermined maximum speed. If for any reason the main governor loses control a separate emergency valve is instantly and automatically closed through an entirely distinct mechanism.

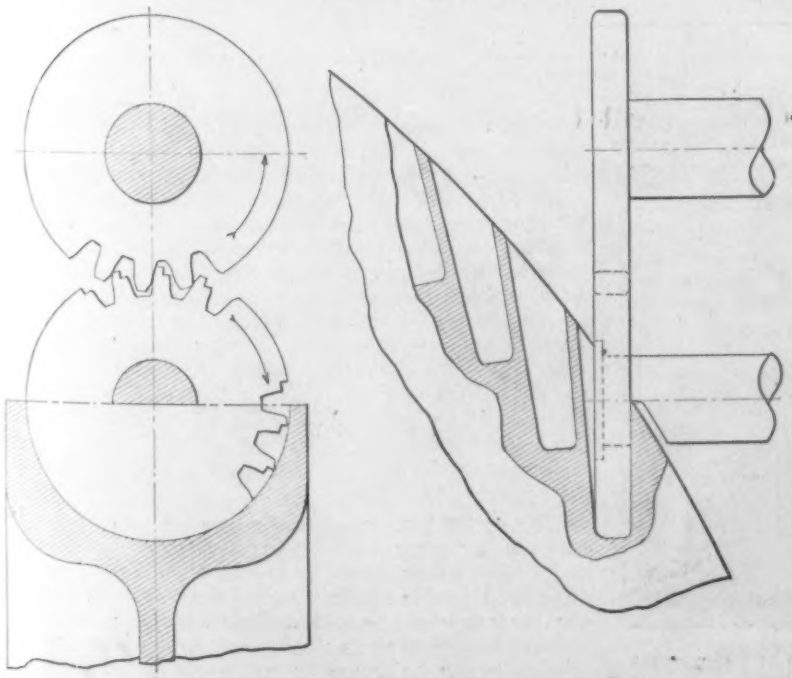
The new turbine is built in five sizes with standard rotor of 12, 18, 24, 30 and 36 in. diameter. By suitably combining the size of a rotor, rotative speed, nozzle capacity and steam pressure a range of from 5 to 200 hp. may be covered by the unit best adapted to the work.



Method of Lubricating the Main Bearings



Sketch Showing Method of Reversing Steam Between the Rotor and the Stationary Buckets Alongside of and One with the Nozzle



Sketch Showing how Buckets Are Formed in the Rotor

Corrosion of Boiler Tubes

The National Tube Company, Pittsburgh, Pa., presents an interesting array of experiments on corrosion of boiler tubes in its Bulletin No. 4. Considerable space is given to an abstract from the Journal of the American Society of Naval Engineers, May, 1904, of the report by Rear Admiral John B. Ford, U. S. N., in which the details of apparatus and methods followed are described that were used in carrying out a series of tests for the purpose of ascertaining the relative corrodibility of lap-welded Bessemer steel, lap-welded iron, seamless cold-drawn steel and seamless hot-drawn steel boiler tubes. Following this a summary is given of corrosion tests of wrought iron and steel conducted under various auspices in subsequent years. Numerous illustrations are given of the relative pitting of steel and iron pipes after varying periods of exposure to the tests.

The conclusion is drawn that steel pipe manufactured eight or ten years ago has proved to be at least as durable as wrought iron of the same period in actual service and that it is reasonable to expect improvements in new materials, to which class pipe steel undoubtedly belongs, compared with wrought iron. It is stated that prevention of the rusting of unprotected iron and steel under the conditions of actual service has not by any means been accomplished, and these materials will always tend to return to their original state in nature, but "the uniformity of corrosion attained in present day pipe steel is a long step forward."

The American Railway Association's statement of idle freight cars in the United States and Canada shows that on January 31 the total was 32,581, a decrease of 57,704 in two weeks. The continuance of cold weather with the consequent interruption of traffic is responsible for this large decrease. In the two weeks preceding January 17 the decrease was 45,000 cars.

The No. 4 Farwell Gear Hobber

A Recent Addition to the Line of the Adams Company for Cutting Spur, Spiral and Worm Gears and Worms.

A new gear hobber adapted for cutting spur, spiral and worm gears and worms up to a maximum diameter of 24 in. has been recently added to the line built by the Adams Company, Dubuque, Iowa. The maximum pitches of the gears turned out by this machine, which is designated as the No. 4 Farwell universal spiral gear hobber, are 3 in cast iron and 3½ in steel. The range of feeds and table speeds is in keeping with the wide variety of work handled and make the machine universal in its application. If desired the hobber can be arranged and the necessary change gears furnished to cut a single thread worm or screw of very fine pitch and from that on up to all pitches and numbers of teeth for worm, spiral and spur gears including all prime numbers to over 1000. Another special feature of the machine is the ease with which it can be converted into a continuous or circular milling machine. Fig. 1 is a view of the machine arranged as a gear hobber, while Fig. 2 shows it equipped for operation as a continuous miller. The position of the head when cutting a spiral worm is brought out in Fig. 3.

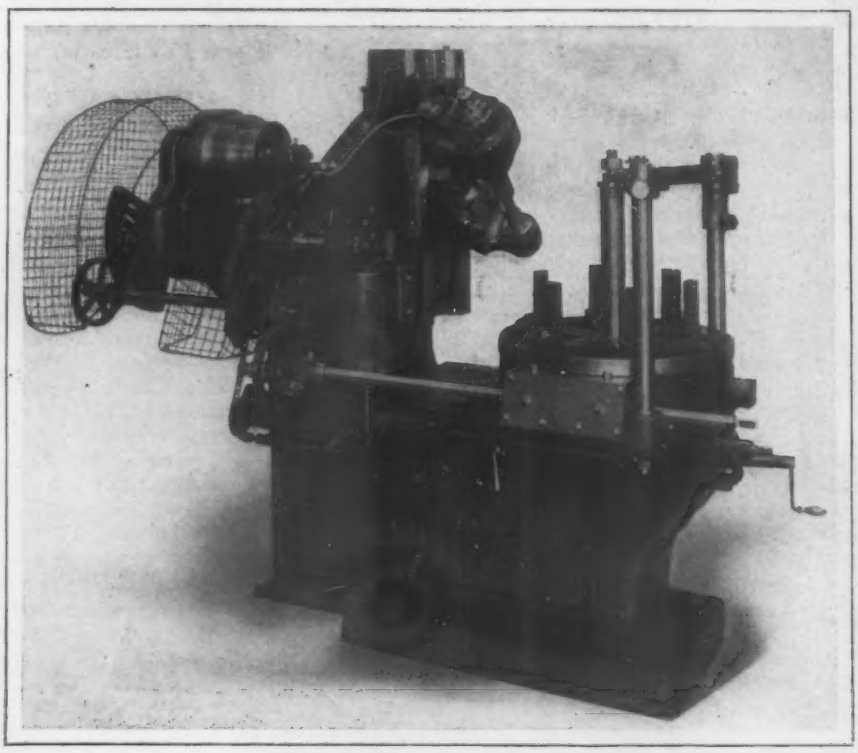


Fig. 1—The New No. 4 Farwell Universal Spiral Gear Hobbing Machine Built by the Adams Company, Dubuque, Iowa

The vertical feeds of the cutter head range from 0.002 to 0.5 in. per revolution of the table, which can be geared to make one revolution for every two of the cutter, or to make one revolution for a thousand or more revolutions of the cutter. This wide range of feeds and table speeds is not needed for the ordinary spur, spiral and worm gear cutting. To obtain it no additional complication of the mechanism was resorted to, and this range was secured by the compounding of a comparatively small number of moderate-sized spur gears and pinions.

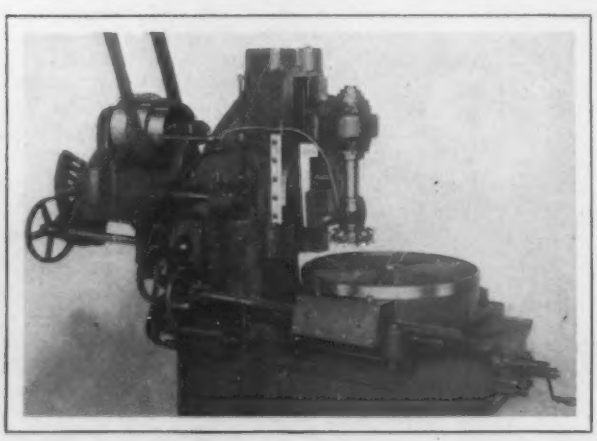


Fig. 2—The Machine Arranged for Operation as a Continuous Miller.

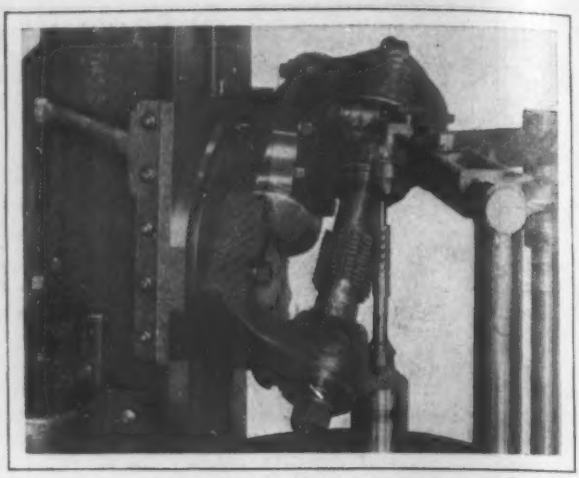


Fig. 3—The Head Tilted for Cutting a Spiral Worm

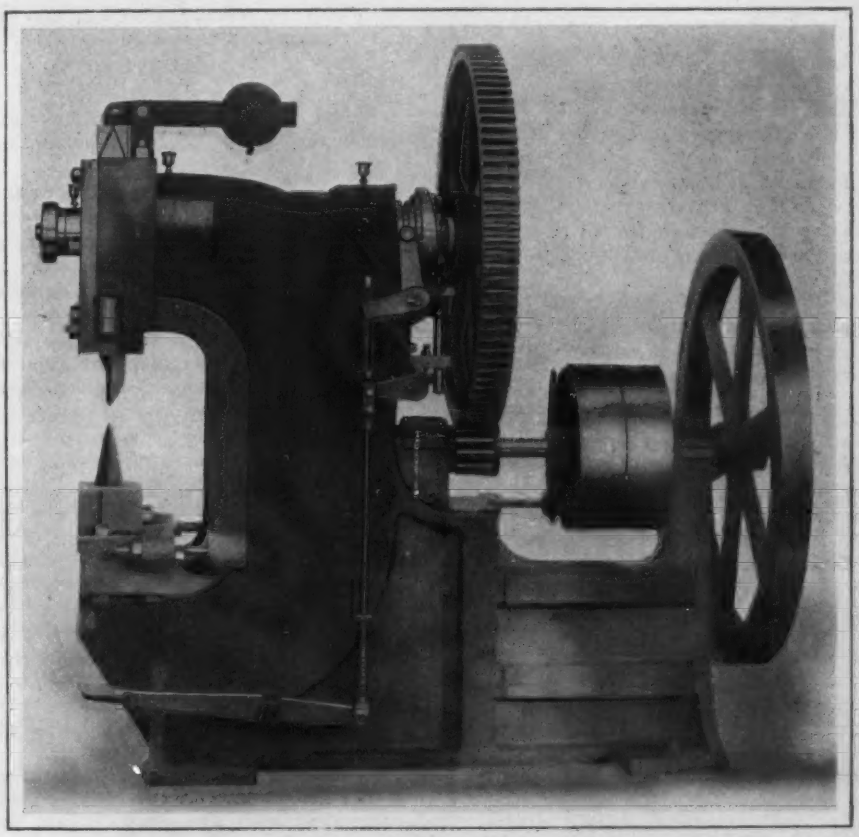
This machine is equipped with a central inclosed bevel gear drive that is necessary to enable the head to be swiveled to any angle, as shown in Fig. 3, for cutting spiral gears and worms. It is pointed out that the compactness and rigidity possessed by the builder's No. 3 hobber, which was illustrated in *The Iron Age*, September 8, 1910, has not been secured, but to give as much rigidity as possible the saddle and the swivel have been made unusually heavy and wide. The cutter spindle is large and has a hole extending entirely through it. The arbor proper passes through this hole and is driven by a long key and feather. End adjustment of the hob to facilitate setting one tooth centrally and to shift to the fresh cutting position is secured by adjusting nuts on the arbor at each end of the spindle. A steel spur gear pinion drives the spindle which together with the pinion shaft runs in adjustable bronze bearings on each side of the gears. It is pointed out that there is only one pair of bevel gears in the spindle driving train, which is two less than is generally used in this type of construction. A large diameter reducing gear is interposed between the cone pulley shaft and the universal joint shaft which transmits power to the spindle, the drive being the same as that used on the No. 3 machine. The universal joints which are of special design are very strong and have large wearing surfaces of steel on bronze. Wear is easily compensated for and felt oil retaining pads facilitate the lubrication of the joints.

The cutter head has a vertical power feed from 0.002 to 0.5 in. per revolution of the table and an automatic stop and a rapid power return are provided. The power inward feed for the table saddle ranges from 0.00025 to 0.375 in. per revolution of the table and an automatic depth stop is provided for use when worm wheels are being hobbed. The table can be geared to cut anything from a single

thread worm to a gear having over 1000 teeth. The regular set of change gears which number 120 will give all the feed changes and will cut all numbers of teeth up to 200 and many composite ones above. For cutting the other numbers, including all prime numbers, this set is supplemented by special gears.

While the machine is especially designed for gear and worm hobbing, the slow travel of the table relative to the cutter speed also enables the machine to be used as a continuous or a circular milling machine. When operating in this way a special spindle and bracket such as is shown in Fig. 2 are furnished. This slow speed is secured by the use of a counter shaft having three clutch pulleys which give a hobbing speed in both directions and the slow speed for driving milling cutters.

The lubricating pump is arranged to run in the right direction when the direction of the spindle is reversed. The table is driven by a steel worm engaging a bronze ring worm wheel which is 20 in. in diameter. Wear either in the mesh or in the end motion of the worm is easily compensated for. The table is of heavy rib or spoke and rim construction with the upper surface between the ribs depressed in cone fashion to a hole in the center instead of being level. This arrangement conducts all cuttings and lubricant into a pan in the base of the machine. From here the latter drains into a tank below. A door in the base of the machine provides for the easy removal of the pan, which is provided with handles, and the dumping of the contents. The complete weight of the machine is approximately 3900 lb.



An Improved Type of Sprue Cutter Built by the George Whiting Company, Chicago, Ill.

Germany's Huge Machinery Exports

Germany's exports of machinery underwent a big increase last year, says our Berlin correspondent. The total was 548,000 metric tons, valued at 705,000,000 marks, comparing with 460,000 tons, valued at 596,000,000 marks for 1910, and 382,800 tons, valued at 502,000,000 marks for 1909. Imports were also somewhat heavier than for 1911, having amounted to 78,000 tons, against 71,000 tons in 1910.

In certain well-managed manufacturing plants great pains are taken to make fire pails conspicuous objects. A popular marking is a white body with a broad bright red stripe at the top and bottom. The combination is so vivid that the pail stands out as a prominent spot. The advantage gained is twofold. The pails are more apt to be observed, to ascertain if they are filled for emergency use, and in time of need employees would lose no precious seconds in finding them.

The E. & G. Brooke Iron Company, Birdsboro, Pa., will build an additional Roberts two-pass fire brick stove at its blast furnace plant. Frank C. Roberts & Co., Philadelphia, are the engineers.

An Improved Sprue Cutter

A new style of geared sprue cutter has been recently designed and built by the George Whiting Company, 1701 Elston avenue, Chicago, Ill., for the Chicago Steel Foundry Company. This machine is intended for use in steel foundries, to take the place of saws and to reduce the labor and the cost of chipping steel castings. In designing this machine care was taken to see that the construction was such as to enable the operator to get as close as possible to the casting while trimming it. It is pointed out that this can be done to such an extent that the time of trimming the castings as compared to performing the operation with a hand chisel or a metal saw has been greatly reduced.

The knives on the machines are those used for cutting off risers, gates and sprues up to the capacity of the machine, but if desired an extra pair of cutters for trimming light fins from steel castings can be furnished which will cut very close to the casting. These knives can be set to cut either way. In the accompanying engraving the knives are set to cut at right angles to the throat, but if desired their position can be changed by the purchaser so that the cutting edges will be parallel with the throat. Provision has been made to compensate for the wear of the lower blade, and the knives have been so designed that they can be reground to give a serviceable edge for use on general work.

The cutter is fitted with an automatic stop and is arranged with tight and loose pulleys having a belt shifter. The fly wheel is crowned for the belt from the motor, and provision is made on the back stand for directly connecting the motor if this type of drive is desired. In this case the motor rests on a bracket attached to the back stand and is directly connected to the machine. The shaft of the cutter is a double hammered steel forging, and the machine is operated by a pintle movement having a cast-steel pintle bushed with phosphor bronze. An adjustment is provided on the lower block, which holds the cutter so that it will line up with the top knife, an arrangement which insures an accurate cut.

A bar head is furnished on the end of the machine for pulling down the head and lining up the top cutter, to see whether it is in the proper position. This arrangement also enables the operator to make an accurate cut for trimming castings and permits him to pull the cutter down to the exact shearing point before starting the machine.

The cutter is made in different sizes and in the type illustrated runs at a speed of approximately thirty strokes per minute. If desired the gears can be removed and the cutter equipped with a fly wheel to run at the rate of ninety strokes per minute.

J. P. White & Son, Cadiz, Ky., have blown out Center (charcoal) blast furnace, in the western part of Trigg County on account of the dull pig iron market.

Correspondence

Power Requirements for Rolling Mills

To the Editor:—A study of the article on mill power, which appeared in *The Iron Age* of January 4, 1912, suggests several points the accuracy of which is very doubtful and upon which further information would be helpful toward obtaining a grasp on the author's meanings. These notes will be made under two headings: 1. On the descriptive matter; 2. On the power curves.

Description of the Testing Apparatus

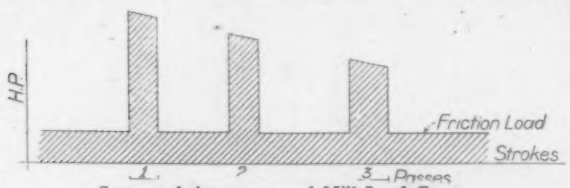
The author's claim to originality is not well founded, as the subject was treated in Stahl und Eisen as early as 1881; and a very complete and correct method, by Puppe, was published in 1909. The same is true of the apparatus, as a similar instrument (though not so elaborately finished) was used in another steel works nearly two years ago.

Although the "guessometer" was not used in the field test, it was overworked in the presentation of results, as will be shown later. It is interesting to note that the cause was given for a discrepancy of 0.04 per cent. in the calculations, while errors in analysis of 100 per cent. are found in many points of the power curves. The Fery (radiation) pyrometer has proved very satisfactory in several tests and is accurate enough for all practical purposes, the scale on the steel being not at all troublesome after the first pass.

It is very misleading to state that an adequate mill power test can be conducted by one man. At the least calculation, five are required, one at the tachograph, two for four indicators and two at the pyrometer.

The Power Curves

Several doubtful phases of the power curves will now be mentioned. Considering "Graphical Exhibit Card No. 7," it will be noticed that immediately following Pass 2, from revolutions 12 to 15, a considerable mean effective pressure is shown. Since the pass has been completed, the only mill load is friction, and since the tachograph record



Suggested Appearance of Mill Load Curve

shows no variation in speed at this point no energy is beinb absorbed by the flywheel; therefore it is impossible to account for the work represented by this mean effective pressure at the recorded speed.

The following equation will be admitted:

$$\text{Mill load} = \pm \text{i.h.p.} \pm E_f \text{ (flywheel energy)}.$$

The i.h.p. is positive or negative as shown by the indicator cards. E_f is positive when the engine speed is decreasing; negative when the speed is increasing, and zero for constant speed.

Mill load is *always positive* and varies from the maximum required to roll to the friction load, which is shown at the beginning of the power curve to be about 300 hp.

Between passes the only mill load is friction, which in a three-high mill varies but slightly. During a pass the load is composed of friction plus the power required to displace the metal, which must be practically constant, per unit of metal, from the instant the rolls grip the steel until the instant the pass is completed. Therefore the total mill load curve must have the general appearance given in the accompanying sketch. If the i.h.p. and E_f curves do not combine to produce the result here illustrated there must be error in data, in analysis or in plotting of results.

Some examples of this can be mentioned. At the ninth revolution 1200 hp. is being given to the flywheel; the i.h.p. of cylinders, the only source of power, shows only 800 hp., plus the friction mill load of 300 hp., which we must have at that point, instead of the negative 700 hp. as plotted. A similar condition is shown between each pass, the discrepancy increasing in the later passes.

If the passes are marked on the power curve energy it will be noticed that approximately as much work is shown by mill load curves between as during passes, which is manifestly impossible.

In many cases the flow of energy to and from the flywheel does not check with the speed variation; for example, examine revolutions 12, 18½, 23, etc.

In general, it will be conceded that in making the analysis and in plotting the curves complete disregard has been shown for the positive and negative signs in the power equation given above.

In conclusion, it is evident that true power curves could not have the forms shown in the article under discussion, and that therefore serious errors must have been made in the evaluation and analysis of data in the calculations and in the statements of conclusions.

Pittsburgh, Pa. CHAS. FITZGERALD, JR.

The foregoing letter was submitted to Mr. Roberts, the author of the article referred to, and below is his reply:

To the Editor:—Replying to Mr. Fitzgerald's criticisms of the article entitled "Power Requirements for Rolling Mills," published in *The Iron Age* of January 4, 1912, covering the methods pursued, the apparatus employed and the graphical exhibits, the writer begs to submit the following:

The Testing Apparatus

The "originality" claim must have some weight; at least the writer is exonerated from plagiarism, as your correspondent would insinuate, from the works of either Stahl und Eisen or Puppe, else, being conversant with the subject as contained in those treatises, why should he fail to grasp the author's meaning or seek further information in order to interpolate the different energy curves?

Referring to the tachographic outfit described in the article mentioned, priority of design is questioned because of similar instrument constructed elsewhere nearly two years ago, which your correspondent magnanimously grants is not so "elaborately finished." The writer is fully aware of the device in question, its development and its inherent shortcomings. So, perhaps, the following facts may serve to dispel any illusions the critic may have acquired from his present environment as to the right of the apparatus to exist.

The recording tachograph as illustrated was evolved in its preliminary stages and was applied with all its essential features—barring the half-seconds' pendulum attachment, and a few minor changes (up-to-the-minute finish, etc.)—during the latter portion of 1909. Furthermore, the plate mill test as published was conducted during December, 1910, without the necessity of visiting a particular steel works to sketch a device and, afterward, of developing an instrument with extremely limited paper feed with the mechanism as a matter of course bearing the insignia, "made in Germany."

The fallacy of the expression, "It is very misleading to state that an adequate mill power test can be conducted by one man," can best be illustrated by noting the various steps pursued to obtain the elimination sought. The experimenter having adjusted the indicator charts and pencil arms, with the tachographic's circuits and feed properly linked to the mill under test, he stations himself at the push buttons and awaits the approach of the steel to the rolls. A moment before the piece strikes the rolls, he throws the main switch and introduces the paper chart between the feed rollers. All the events of the cycle, such as length of pass, strokes of engine, half-second intervals and speed fluctuations, are automatically recorded. Thus the only two matters demanding his attention are the two push buttons; the one tracing the identification line is depressed at irregular intervals; the other button, energizing the solenoids attached to the indicator pencil levers, is kept closed during the entire mill cycle. Are any other observations imperative in the field of investigation? In the event temperature determinations (not absolutely essential to a mill power test) are desirable, one observer suffices to manipulate the thermo electric outfit to secure rapid and practically correct readings. On the other hand, the Fery radiation pyrometer requires at least 30 seconds to make the readings, with an uncertain correction factor for hot bodies in the open, and the time lapse for each observation is absurd when the entire mill cycle covers less than 70 seconds. Has the critic ever attempted to apply a pyrometer to this class of service, or does he again rely upon the statements of Puppe?

Analysis of Power Curves

As your correspondent points out, the graphical exhibit card indicates a considerable mean effective pressure from revolutions 12 to 15, immediately after the completion of the second pass, more energy being developed in the cylinders than could possibly be absorbed by the wheel with the small acceleration in speed shown by the tachogram specimen chart presented thereon. In my letter to you of October 17, 1911, I stated that "the particular diagrams and tachographic records used in working up the data were so badly soiled as to be unfit for reproduction." This accounts for the seeming discrepancy, and but rehashes your own inferences at that time.

Mill Load Curve

The curve labeled "Load on Mill," in conjunction with the other power curves on which your correspondent trains his broadsides with the evident pleasure of finally ensnaring the writer with no chance to escape, may appear somewhat irrational to both himself and the persons behind his guns, also to Dr. J. Puppe, none of whom have ever attempted to differentiate in a pictorial sense the respective energy components of the rotating masses and cylinder efforts inherent to rolling sections, but have been content to express themselves analytically, as tabulated in Appendix X [Dr. Puppe's book], or to trace the results graphically, the general appearance of the curves only too truly conforming to your correspondent's acompanying sketch.

Does the latter really represent the total mill load and relative position of the passes of a steam driven unit with a heavy flywheel intervening? Rather, is he not confused from a study of Puppe's method, who has confined himself almost exclusively to electrical drives, whereby the current curve was used for determining the length of pass, so that the commencement of pass is indicated by an increase of current while the end is marked by a sudden drop in the current; the length between these points, divided by the paper speed (2 mm. per second), giving the time taken by the respective pass and interval. This is likely the proper method of procedure in the case of a motor-driven mill, which is extremely sensitive in respect to measuring instruments to a fluctuating load but how about the accuracy when one is compelled actually to measure passes representing 0.3 second on the speed charts, with only 2 mm. feed of paper per second, the approximate travel adopted in his representative instrument?

Since all the energy must originate in the cylinders, and, as your correspondent so forcibly emphasizes, mill load is always positive, is not his sketch, which plots the total mill load and its distribution, nothing more than a copy of the graphical exhibit card 7, with the position of the passes misplaced in his sketch. Since the governor of the engine necessarily lags until the wheel decelerates in speed, the engine will negotiate the earlier and a portion of the longer passes before the cut-off is lengthened, and the maximum cylinder efforts are exerted to restore equilibrium only after the pass is actually completed.

Now, as to the general form of the power curves, if your correspondent is familiar with alternating-current phenomena, he may be able to follow the analogy that suggested the adoption of the method for plotting these curves. In the alternating-current power circuit, the current and voltage, rising and falling sometimes in phase or otherwise, transmit just as much energy when the alternations are negative as positive, yet some conventional lines were necessary to picture their instantaneous values to the eye.

A similar treatment can be made of the energy curves developed while rolling by considering the cylinder efforts analogous to the current and the energy of the rotating masses to the voltage, their algebraic sum at each instant being equivalent to the product of the simultaneous values in the electrical circuit or the watts generated. Thus their combined values are plotted in a curve termed the "Mill Load," which is perhaps a misnomer, as it could more properly be entitled "The Instantaneous Power Value Curve." This represents quite forcibly, as the writer endeavored to show, the importance of the fly wheel in rolling mill work. Therefore, this method of treatment of the fluctuating loads characteristic of the service was not primarily intended to displace the more accurate graphical exhibit as traced on the chart of cylinder-effort; rather, it was presented as a supplement to a complete rolling mill test, so that the eye might grasp or digest the functions of both the cylinder and flywheel efforts during the cycle.

In conclusion, I might add that any discussion arising from a published article should be welcomed, provided it is advanced for the purpose of acquiring additional knowledge of the subject, for very few articles are worth while or possess merit that do not awaken full discussion or invite criticism.

S. S. ROBERTS, Testing Engineer,
Carnegie Steel Company, Homestead Steel Works, Munhall, Pa.

Programme of Boiler Manufacturers' Convention

At the twenty-fourth annual convention of the American Boiler Manufacturers' Association, to be held in New Orleans March 12 to 15, the following papers will be presented for discussion:

"Rivets," by D. J. Champion, vice-president and general manager Champion Rivet Company, Cleveland, Ohio.

"Compressed Air and Its Uses," by Thomas Aldcorn, Chicago Pneumatic Tool Company, New York City.

"The Manufacture of Charcoal Iron Boiler Tubes," by H. A. Beale, Jr., president Parkesburg Iron Company, Parkesburg, Pa.

"Boiler Explosions: Their Causes and Prevention," by Francis B. Allen, vice-president Hartford Steam Boiler Inspection & Insurance Company, Hartford, Conn.

"The American Boiler Manufacturers' Association as it Is and as it Should Be," by W. H. S. Bateman, sales agent Champion Rivet Company, Parkesburg Iron Company, Chicago Pneumatic Tool Company.

"Segregation of Steel," by Charles L. Huston, vice-president Lukens Iron & Steel Company, Coatesville, Pa.

"Modern Boiler Shops and How They Should Be Equipped," by H. C. Meinholtz, superintendent Heine Safety Boiler Company, St. Louis, Mo.

The question of uniform boiler laws will be taken up, and it is hoped that a set of uniform laws will be adopted at this convention. This is a question which is of the greatest importance to all boiler manufacturers in the United States and Canada, and also to all insurance companies and members of the United States Government Inspection Department, as well as those of the city and State boiler inspection departments.

A ladies' auxiliary is to be formed at the New Orleans convention and an excellent programme of entertainment is being provided for the visiting members and guests.

The Southern Iron & Steel Company

At the annual meeting of the Southern Iron & Steel Company, held in New York City last week, H. S. Fleming, William R. Saintsbury, James A. Green, John R. Turner and John J. Miller were elected directors to fill vacancies. Cornelius Vanderbilt, whose term expired, was re-elected. At a meeting of the directors James Bowron, former vice-president, was elected president. H. F. Fleming and John J. Miller were elected members of the executive committee.

Chairman Grenfell of the executive committee said that operations for the year ended December 31, 1911, resulted in manufacturing profits of about $135,000 and exclusive of interest charges there remained a deficit of $146,384, compared with a deficit of $680,094 in 1910. Considerable progress had been made during the year and business may yet become profitable if the plants are worked at full capacity. They were shut down during July and August, and when operations were resumed in September a scarcity of skilled labor was encountered. In all, 300 new customers have been secured and trade established in 140 new towns. Iron sales amounted to 11,382 tons in 1911, as against 2239 in 1910. Billet sales increased from 3960 tons in 1910 to 9486 in 1911. Sales of other products increased in proportion.

The Stevens-Duryea Company, Chicopee Falls, Mass., last week placed the largest order for structural steel ever given by a New England motor car maker, in awarding a contract to the American Bridge Company for additional buildings, soon to be erected in East Springfield, Mass. It is understood that this contract covers approximately 4000 tons of steel, delivery to be on or before April 5, next.

Structure and Heat Treatment of Tool Steel*

Results and Methods of Annealing—Distribution of Cementite the Key to Cutting Quality—The Place of High Speed Steel

BY J. V. EMMONS.†

Tool steel consists essentially of iron and carbon. There are, however, four other elements always present. Two of them, phosphorus and sulphur, are injurious impurities, while the other two, manganese and silicon, have some more or less valuable effect when present in certain proportions. The gases oxygen and nitrogen are also present in small amounts as injurious impurities, but are not usually taken into account. There are sometimes added other elements in order to produce a special grade of steel for special purposes The principal ones of these are nickel, chromium, tungsten, vanadium and molybdenum. The carbon in tool steels varies from about 0.80 per cent. to 1.50 per cent. according to different requirements. An analysis which is widely used for cutting tools and which may be taken as typical is as follows:

	Per Cent.
Carbon	1.20
Manganese	0.30
Silicon	0.15
Phosphorus less than	0.020
Sulphur less than	0.020

Tool Steel Structure

In the last few years it has been recognized that the structure of tool steel has fully as much to do with its properties as the chemical composition. This has led to the establishment of microscopic equipment in all well-equipped steel laboratories. The names of the microscopic constituents of tool steel are probably familiar to many of you.

Ferrite is pure iron. It is usually recognized by its irregular hexagonal shaped grains. It is soft, ductile, has little strength and cannot be hardened. It occurs in tool steel normally only when mixed with cementite to form pearlite. It is found, however, in connection with certain abnormal conditions such as bark and graphite. These will be considered later.

Cementite is a carbide of iron containing 6.6 per cent. carbon. It is very hard and brittle, resembling glass in these particulars. Cementite is contained in small quantities in all tool steel over 0.80 per cent. in carbon.

Pearlite is a mechanical mixture of cementite and ferrite, the two being arranged alternately in very thin plates. It contains 0.80 per cent. carbon and is soft and tough. Pearlite is the chief constituent of annealed tool steel.

Martensite in tool steel contains from 0.70 to 0.90 per cent. carbon and is produced by quenching in water or some similar bath from a temperature above the critical point. It consists of interlacing needles, which structure gives it great strength and hardness. Martensite is the principal constituent of hardened steel. See Fig. 1.

Sorbite is a transition form between martensite and pearlite. It may be formed by fairly rapid cooling from above the critical point or by drawing the temper of hardened steel. It is harder than pearlite and has great strength. Sorbite is the principal constituent of tool steel as it comes from the rolls or forge. Several other constituents and transition forms are known, but the above are of the greatest practical interest.

Methods of Inspection

The inspection of tool steel is one phase to which the consumer frequently gives too little attention, and to this fact a large majority of the difficulties encountered in heat treatment may be attributed. There are two methods of inspection to use. The first is by chemical analysis and microscopic examination which are available only with laboratory equipment. The second is by the examination of the surface of the bars, plates, etc., and of the hardened fracture by the naked eye or the hand magnifier. The first named method is the most accurate known and to it we owe most of our present knowledge of tool steel. The second method is much less accurate when used alone, but in skilled hands it gives most valuable indications of the condition of the steel. It has the advantages of being inexpensive and available even in small shops. It is possible to detect in this way surface cracks, the presence of bark, pipes, overheated structure, graphite and bad cases of segregation of cementite. (See Fig. 6.) Microscopic examination shows in addition to the above the amount and condition of the bark, the exact amount of segregation, the approximate amount of graphite and the precise amount of overheating, all of which are necessary for the intelligent handling of tool steel.

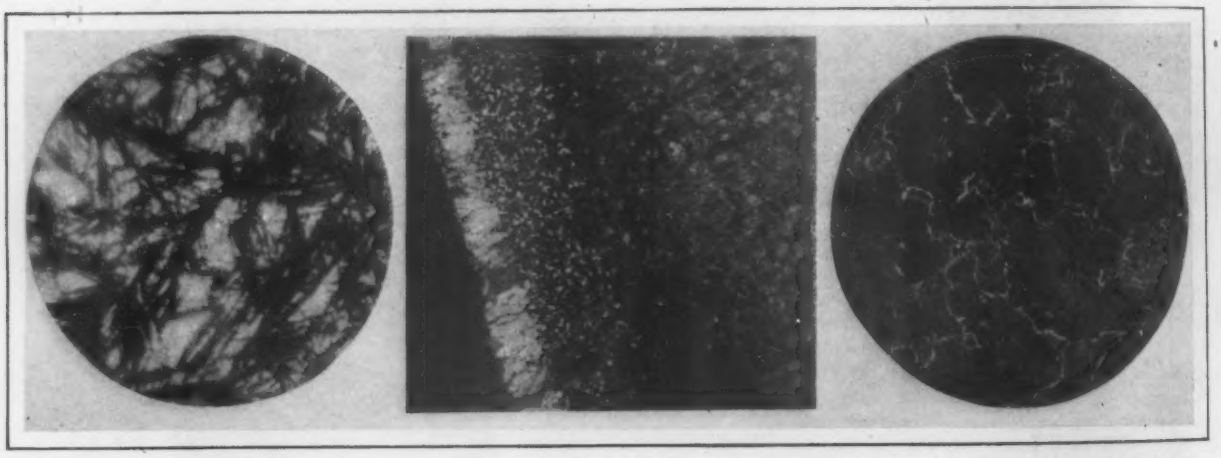


Fig. 1—Martensite

Fig. 2—Bark

Fig. 3—Cementite Net Work, Liable to Fire-crack

Annealing Temperatures

The first step in the process of heat treatment is annealing. There is no best way to anneal tool steel. It is impossible for any one method to satisfy all conditions. Every consumer has his own special problem of annealing, the solution of which depends on the grade of steel used, the condition of the steel before annealing and the results desired.

Plain carbon steels are divided by the manufacturer into several grades, ranging from 0.70 to 1.50 per cent. carbon. In addition to these numerous grades of alloy steels are coming into wide use, known as chrome steel, nickel steel, tungsten steel, vanadium steel, chrome-tungsten steel, chrome-vanadium steel, etc. These special grades

*A paper read before the Metal Trades Superintendents' and Foremen's Club, Cleveland, Ohio. February 17, 1912.

†Chief chemist, Cleveland Twist Drill Company.

have widely different properties and frequently require special treatment.

The limit below which it is not practical to anneal tool steel is about 1200 deg. F. The high limit above which it is not safe to anneal tool steel is about 1500 deg. F. In this range of 300 deg. practically all annealing operations are carried on. This great variation in heats is required mainly because of the previous condition of the steel or because special results are required. Steel as it comes from the mill is said to be in the natural state; but this is very indefinite, as it may be in any one of a variety of conditions due to a lack of uniformity of melting, soaking the ingot, rolling, etc. The normal structure for unannealed steel is sorbite, containing in the case of steels over 0.80 per cent. carbon a fine well distributed network of cementite.

For the proper regulation of annealing temperatures a knowledge of the critical point of the steel is necessary. The critical point in tool steel, or the recalescence point, as it is sometimes called, is the point in heating steel where the cementite is dissolved by the iron, and is the point in cooling where the cementite crystallizes out of the iron. This might be roughly compared with water at about the freezing point. For the sake of comparison, call the freezing point of water its critical point. If you cool the water slightly below the critical point needles of ice at once begin to form. If we heat it above the critical point the needles at once melt or are dissolved. The cementite in tool steel behaves in the same way. If we heat it above the critical point, which is about a cherry red heat, or 1375 deg. F., the cementite melts or is dissolved in the iron, but as soon as it cools again the cementite at once crystallizes out. This separation of the cementite takes a certain amount of time. The hardness and toughness of hardened steel are due entirely to the fact that the steel is cooled so rapidly from above the critical point that some of the cementite is trapped in the iron by the sudden stiffening of the cooling metal, forming martensite or hardened steel. But if the cooling from above the critical point is prolonged, the iron and cementite separate and lie side by side in the form of pearlite, or annealed steel. The critical point is marked by a number of interesting phenomena, among the most important of which from a practical standpoint is the loss of magnetism. The critical point may be roughly determined as the temperature in heating at which steel no longer attracts a magnet, and the temperature in cooling at which it begins to attract a magnet.

Changes in Annealing

The varied results which it is necessary to accomplish by annealing demand a wide range of treatment. The principal purposes for which tool steel is annealed are:

1. To put it in condition to harden properly.
2. To put it in condition to machine.
3. To put it in condition to draw into wire.

To put steel in condition to harden, it is necessary to give it the finest possible structure and at the same time the best possible distribution of cementite in case the steel is above 0.90 per cent. carbon. It is generally recognized that this may be best accomplished in steels which have no abnormal conditions present, by annealing at a temperature slightly above the critical point. If a laboratory and pyrometers are available the critical point for each grade of steel used may be determined accurately. If these facilities are not at hand, the critical point may be determined roughly by means of a magnet.

To put steel in condition for machining, it is necessary to take into account the different machining operations. The three principal operations on tool steel are turning, milling and threading. The turning operation requires steel as soft as it can be obtained. The milling operation requires steel slightly harder, in order that the metal will not drag, making the work rough and gumming up the cutter. The threading operation requires steel still harder, in order that the metal will not drag nor the threading tool throw up a burr. Steel that will thread perfectly will frequently cause great difficulty in turning. Where only one of these operations is necessary, the annealing may be adjusted with little difficulty, but if two or three of the operations must be performed upon the same work, the only solution of the problem is to endeavor to strike the happy medium where all of the operations can be performed at least fairly well.

In drawing tool steel into wire it is necessary to anneal after each draft, in order to soften the steel and restore the low elastic limit destroyed by the stretching as it was drawn through the dies. This wire is annealed by heating to a temperature considerably below the critical point for a considerable length of time. The low temperature is necessary to avoid the formation of bark and graphite.

Correcting Abnormal Conditions

Some of the abnormal conditions which may be present in unannealed tool steel are: (1) Coarse structure, due to overheating or a high finishing temperature under the rolls. (2) Segregation of cementite. (3) Bark.

The refining of the coarse structure due to overheating usually requires a double treatment, involving first an annealing at a temperature from 100 to 150 deg. above the critical point. This annealing completely breaks up the overheated structure. It is then given a second annealing slightly above the critical point to refine still further the structure left by the first treatment.

The segregation of cementite, caused usually by prolonged soaking, is in danger of being increased by annealing. If it is not too far advanced it may be improved by a treatment similar to that for overheated structure.

Bark and graphite are the two most undesirable products of annealing. Bark is the completely or partly decarbonized layer of steel near the surface. It is due chiefly to the oxidizing action of air and other gases upon the steel while it is at a high temperature. It has been observed in depths varying from 0.001 to 0.125 in. All steel has more or less bark unless it has been removed by pickling or grinding. The principal cause of its production in annealing is an oxidizing condition which may be due to air, a large quantity of scale or rust on the steel, or some packing material which contains oxygen. (See Fig. 2.) It is very important that all of the bark be removed from the steel, for the very simple reason that it

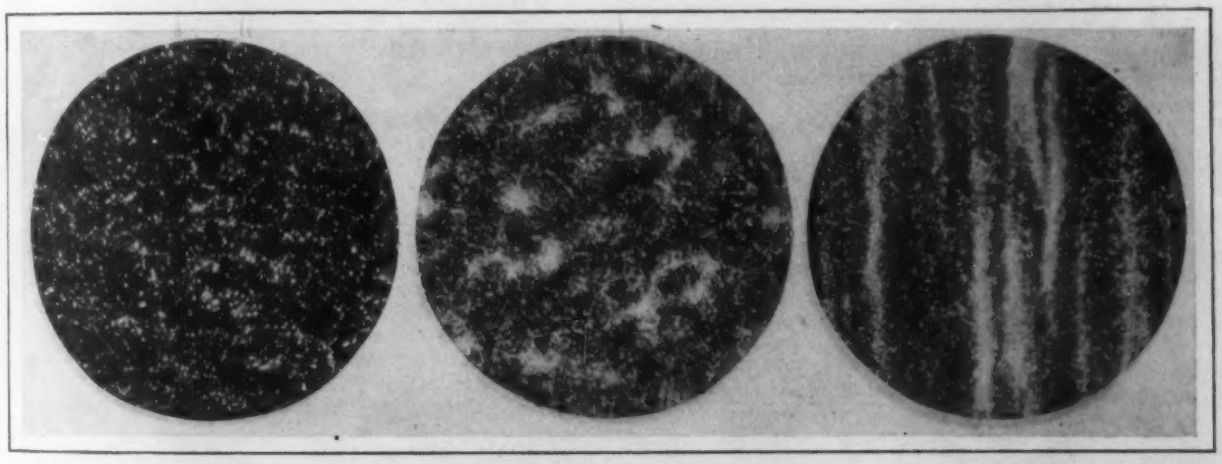


Fig. 4—Cementite Broken Up; Not Liable to Firecracks

Fig. 5—Poor Distribution of Cementite

Fig. 6—Segregation of Cementite (Longitudinal Section)

will harden only in proportion to the amount of carbon it contains, which in any case will be less than that of the interior of the steel and may be so low that it will not harden at all.

Another difficulty caused by bark is in the turning operation. In a high carbon steel containing from 1.00 per cent. to 1.50 per cent. carbon a large part of the bark will approximate 0.70 per cent. to 0.80 per cent. carbon. The critical point of steel containing 0.70 per cent. to 0.80 per cent. carbon is very low. Therefore when the steel is annealed at its appropriate temperature the bark is considerably overheated, with a resulting coarse structure.

On round bars this forms a ring of hard overheated steel which is extremely difficult or even impossible to turn accurately. The best remedy for this condition is to anneal in such a manner as to produce no bark; but if it is necessary at any time to soften a bark so that it may be machined this may be done by reannealing at a temperature varying from 1330 to 1375 deg. F., depending on the grade of steel used.

The second by-product of annealing is graphite carbon, sometimes known as "black fracture" or "black center." In this condition part or all of the carbon has been driven out of combination in the form of graphite. This practically amounts to changing the tool steel into a high grade of malleable cast iron. It is caused by either repeated annealings or prolonged annealing at a temperature below the critical point. Once formed the only remedy is to remelt the steel.

Methods of Annealing

When it is desired to anneal steel which has already been hardened, annealing at a temperature just below the critical point is usually satisfactory. High speed steels may be annealed at temperatures varying from 1325 deg. F. to 1400 deg. F. in a manner similar to plain carbon steel. Greater care is usually taken to pack the steel in such a manner as to prevent bark.

There is a method of quick annealing high speed steel which is useful where it is necessary to anneal a single tool as quickly as possible. It consists simply in heating the tool to 1300 deg. F., allowing it to cool in the air, reheating to 1300 deg. F. and holding at the heat for 30 minutes, then allowing to cool in the air. This will be found successful for most high speed steels now on the market, making the tool soft enough to machine and putting it in condition to reharden perfectly.

Tool steel to be hardened must be heated to a temperature above the critical point and cooled rapidly in some quenching bath such as water. The degree of hardness depends upon the rapidity of cooling and also upon the amount of carbon present. The higher the percentage of carbon and the faster the cooling the harder the steel will become. When tool steel is quenched at a temperature slightly above the critical point it has the finest structure that it is possible for it to attain. The higher the heat above the critical point the coarser the structure becomes. The hardening temperature for most tool steels in use today come between 1360 deg. F. and 1450 deg. F.

Closely connected with hardening is the drawing operation. For most purposes it is found necessary to draw or temper hardened steel in order to relieve strains and increase the toughness. This is accomplished by reheating the hardened steel to a low temperature varying from 400 deg. F. to 600 deg. F. according to the degree of hardness and toughness it is desired to obtain.

One of the principal difficulties encountered in hardening steel is the liability to firecrack. Firecracks are especially liable to start from sharp corners, sharp angles, or deep recesses. These should be avoided in the design of tools whenever possible.

Distribution of Cementite

The two principal causes of firecracks are high sulphur content and bad distribution of cementite. The amount of sulphur can only be detected by a chemical analysis. The condition of the cementite can only be determined by microscopic examination. The effect of the condition of the cementite upon the hardening of tool steel cannot be too highly estimated. In hardened steel the cementite contains that portion of the carbon which is in excess of 0.80 per cent. The amount of it present is a small matter compared with the condition in which it is present. It should be remembered here that cementite is extremely hard and also extremely brittle. If it is present in a network, long plates, or connected masses, it forms a line of weakness which is easily fractured under the hardening strains. If the cementite is properly broken up by the annealing or previous heat treatment it will be present in small rounded particles each one isolated from the others. Such a structure gives the maximum strength to the steel. If the sulphur analysis of a steel is known to be satisfactory, the relation of the condition of the cementite to firecracks may be expressed briefly as follows:

If the cementite is present in plates or large masses, the tool will firecrack. See Fig. 3.

If it is present finely broken up in round particles, the tool will not firecrack. See Fig. 4.

The effect of the condition of the cementite upon the cutting qualities of the steel tools is of even greater importance. To understand the action of a cutting tool, take the example of a lead lap. If a piece of lead charged with diamonds the size of shot were held against a rapidly revolving piece of metal the diamonds would start to cut, but would be instantly torn away from the soft lead in which they were imbedded. The result would be that the lap would be rapidly spoiled while the work was only roughened. If the lap is charged with fine diamond dust each particle of diamond takes a very small cut and is held firmly by the lead until it is worn away. Such a lap cuts almost as fast as an emery wheel and produces a smooth finished surface with very little wear of the lap.

In a steel cutting tool if the particles of cementite are large, they are rapidly torn away exactly as in the lead lap, causing the cutting edge to crumble and wear away rapidly. (Fig. 5.) But if the cementite particles are small and evenly distributed they are held firmly and stand a large amount of wear. (Fig. 4.) This fact is so important that it may be stated that for tools of the same analysis and degree of hardness, the amount of work done will be in proportion to the fineness of distribution of the cementite.

It may also be stated that for finishing tools the better the distribution of the cementite the finer the finish it is possible to obtain. In this connection it is sometimes asked: Why is it that high speed steel does not make good finishing tools? This can be best explained by a comparison. If you wish to saw a piece of wood in such a way as to leave the smoothest possible surface you naturally select a saw with the finest possible teeth. If you wish to saw very rapidly without regard to the roughness of the work you select a saw with very coarse teeth.

Apply this same principle to steel. A high grade carbon steel properly made into a finishing tool has the cementite distributed in very fine uniform particles in a martensite matrix so fine as to be almost structureless. Such a tool produces a very smooth finishing cut. On the other hand high speed steel consists of fairly large sized grains which break apart, producing a rough edge which will cut very rapidly but not smoothly.

High speed steel, therefore, is suitable for fast, rough work, but is useless when a smooth finish is desired.

The Smoke Problem to Be Investigated

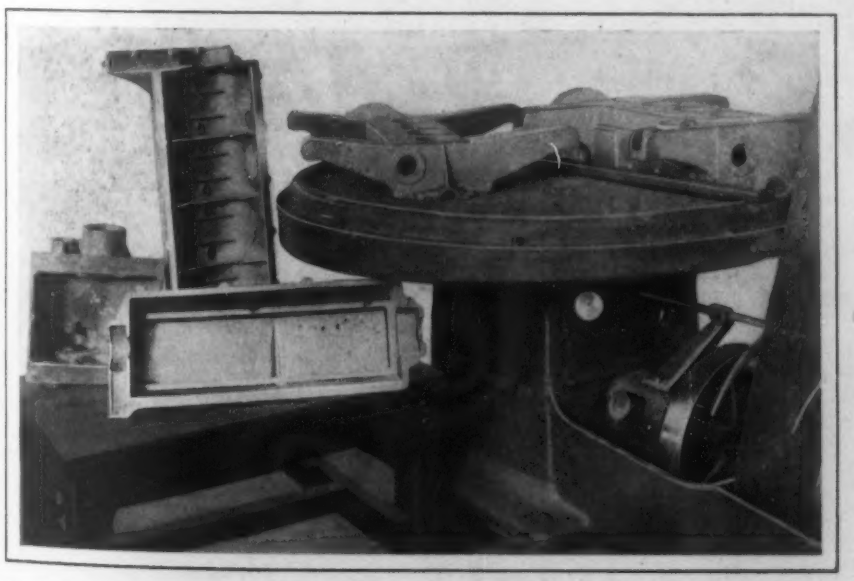
The University of Pittsburgh, Pittsburgh, Pa., is entering upon a study of the smoke problem in the broadest possible manner. The director of the Department of Industrial Research of the University is Robert Kennedy Duncan, while those in charge of smoke investigations are R. C. Benner and W. W. Strong. They are taking as their chief line the effect of smoke on health, plant life and buildings, but they are also considering the increased cost of living due to damage and dirt caused by smoke and the legal as well as the engineering side of the question. Each of these investigations will be carried out by one or more men, each a specialist in his line. It is hoped that by co-ordinating these various researches it will be possible to obtain some valuable technical as well as scientific data. The investigators will at least be able to establish the status of the problem as a whole on a scientific basis. They would like very much to get in touch with persons interested for the purpose of co-operation, information and suggestions.

Finishing Crank Cases

The Gardner Machine Company, Beloit, Wis., has perfected and completed tests on its No. 24 vertical spindle disk grinder with the result that an interesting development in grinding practice has been made. This machine is applicable to the surfacing of much larger work than has been hitherto attempted and the accompanying engraving not only shows the machine itself but also illustrates the character of the work done, namely, the finishing of the cast-iron crank cases for gasoline engines.

In testing the ability of the grinder to handle pieces of this nature, the work was simply laid on the 53-in. revolving disk wheel, the weight of the cases being sufficient to give the pressure required for surfacing them. The two castings shown on the grinder in the accompanying engraving were finished to a smooth, clean surface at the rate of from 10 to 15 per hour, while those at the side were finished in from 3 to 4 min. each. It is stated that it would have been possible to exceed this rate of production if the castings had been truer when they were delivered by the foundry and if the amount of metal which the grinder had to remove in the finishing process had been reduced to a minimum by casting those portions of the piece that were not required for bearing surfaces with the metal depressed. An investigation of the possibilities along this line showed that a reduction of 30 sq. in. in the superficial area of these pieces could have been made without interfering to any appreciable extent with the strength and perfection of the joint between the two parts of the case. It is believed that with such a reduction in the area to be ground the rate of production could have been increased to 20 or 25 per hour.

Other parts finished by the grinding process were bodies, hubs and tops for valve posts. The machining required was the facing off of the oval flanges straight and clean. The bodies were produced at the rate of 10 to 15 per hour, and this was also true of the hubs, while the tops were produced much more rapidly, or at the rate of from 20 to 30 per hour. In connection with these pieces it was found that the surface for the joint could be made much less without impairing its efficiency. This reduction in the area of the surface to be ground, it is explained, might result in a reduction of 75 per cent. in the amount of grinding required, while at a minimum the reduction would be 25 per cent. This change would not only result in making a better joint but it is also pointed out that the saving in metal would be sufficient in not infrequent cases to pay for the cost of the grinding operation so that the finished casting can be produced at no increase in the cost over that of the rough castings formerly employed.

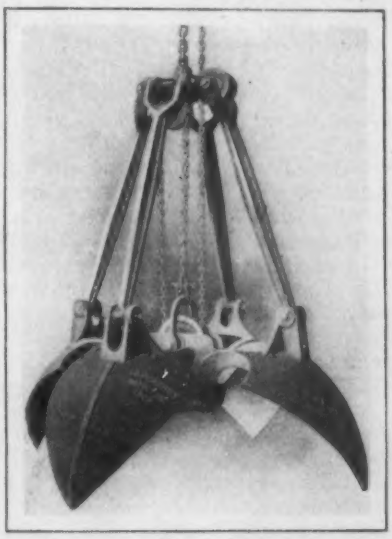


Finishing Cast-Iron Gas Engine Crank Cases by Grinding Them on the No. 24 Vertical-Spindle Disk Grinder, Built by the Gardner Machine Company, Beloit, Wis.

The P. J. Brown Construction Company, Cleveland, Ohio, has finished the rebuilding of four hot blast stoves and relining the stack of East furnace of the Columbus Iron & Steel Company at Columbus, Ohio.

Orange Peel Bucket of Cast Steel

The Rickards orange peel steel buckets embrace a style of dredging and excavating bucket made under the Rickards patents, which have been acquired by the Industrial Supply & Equipment Company, 407 Sansom street, Philadelphia, Pa. They are made of acid open-earth cast steel, with four curved triangular blades, which, in addition to giving an extra wide spread, form when closed a tight semi-spherical bowl, the curved arms of the blades aiding in holding loose material in the top of the bucket and materially increasing its capacity. The center block, also of cast steel, is designed to allow the bucket to hang central at all times. The operating levers are attached to the shell by lugs on the outside of it, so that they can in no way interfere with the loading or unloading of the buckets.



Cast Steel Bucket Made by the Industrial Supply & Equipment Company, Philadelphia

The parts of the Rickards buckets are interchangeable, being cast from patterns numbered and lettered to facilitate the ordering of duplicate parts. The bearings are bushed with steel, admitting ready replacement if necessary. A user of these buckets states that "by keeping on hand steel tubing of three different sizes the necessary sections for bushings may be sawed off and all the bearings rebushed, the entire operation being completed in one to two hours, according to the size of the bucket." There is, of course, an absence of rivet heads, etc., to the blades. Under ordinary circumstances chain wheels are supplied with all buckets, although wheels for use in connection with wire rope are furnished if desired. The buckets are designed for hard service with heavy parts. Three sizes of blades can be used on the same crown rigging, giving a wide spread of capacity. The buckets are made in sizes of 1 cu. ft. to 10 cu. yd. capacity. The approximate weight of a 1-yd.-capacity bucket is about 4000 lb. It may be added that the double bearing at the top of the levers serves to maintain alignment and satisfactory closing of the blades of the bucket.

At the annual meeting of the J. W. Paxson Company, foundry supplies, Philadelphia, Pa., H. M. Bougher was re-elected president and general manager; Howard Evans, vice-president; S. C. Bougher, treasurer and purchasing agent; Sherman Bougher, secretary, and J. S. Hibbs, assistant general manager. Capt. L. B. Shaw, formerly vice-president and marine superintendent, has severed his connection with the company, and James L. Crawford has been appointed marine manager.

Government Work Shop Management

The Arsenal Labor Troubles as Viewed from the Official Side — Defense of Management by Army Officers

BY LIEUT. COL. W. S. PEIRCE*

The issues of *The Iron Age* of January 11, January 25, and February 1 of this year contain a series of articles by Max H. Brombacher purporting to give an impartial résumé of that part of the hearings held at Boston and Washington before a special committee of the House of Representatives, appointed to investigate the Taylor and other systems of shop management, which concerned particularly the Watertown and Rock Island arsenals.

The records of these hearings, as stated in the articles referred to, are voluminous, and that fact, coupled with the limited circulation that such an official document can have, will prevent the general public from reading the record and forming its own conclusions from such first-hand information. Mr. Brombacher's articles in *The Iron Age* will therefore attain a much wider circulation than will the committee's report and, in the absence of any other presentation, would undoubtedly be accepted as accurate. His account, however, conveys a distinctly unfavorable impression of the methods of Government manufacturing establishments in general and of the Watertown Arsenal in particular, resulting apparently from an unprejudiced interpretation of the testimony given, an impression which I believe to be unjustified by a fair consideration of all the facts in the case.

Mr. Brombacher's Opinion Not Justified

Right here let me make my position perfectly clear. I am not criticising Mr. Brombacher because he has formed an opinion different from mine, but because he has sought to impress his opinion upon the public generally by a version of the hearings in question which I do not believe is justified by the facts. Though his articles indicate a thorough examination of the record and present all the evidence of having been carefully prepared and, therefore, of expressing his deliberate purpose and mature conclusions, I am unwilling to believe that, for personal reasons, he intentionally gave an unfavorable color to the Government's case.

But even though his failure to mention some important points and his ambiguous phrasing of others be not intentional, the effect of his articles is nevertheless unfair. With Mr. Brombacher personally I have no controversy and have no intention of engaging in one, but justice to the earnest, conscientious, and valuable work which the present able management of the Watertown Arsenal has been doing seems to require that his estimate of its fitness and of its administration shall not pass unchallenged.

Mr. Brombacher's articles have a particularly convincing tone because he appears, from his review of the testimony, to have been forced reluctantly and regretfully to the conclusion that the weight of evidence is against the methods of scientific management as applied at the Watertown Arsenal, the manner in which the system is being installed there, and the tact and general efficiency of the officers in charge. With this conclusion I take issue and claim that a really impartial consideration of all the testimony, giving due weight to the degree of personal knowledge and experience of the several witnesses, does not justify it. I share the regret expressed by Mr. Brombacher that the full text of the hearings cannot well be printed in *The Iron Age*, because I am convinced that if it were done the justice of my criticisms of his conclusions would be evident to all readers.

To attempt to take up in detail each of the instances cited by Mr. Brombacher would consume more space than I feel entitled to ask. I shall therefore select a few of them which are made to reflect most seriously upon the officials concerned and the methods in use at the Watertown Arsenal and which will serve to indicate sufficiently the attitude of mind in which Mr. Brombacher appears to have approached consideration of the question.

Molder Edgecombe's Pommel Mold

Taking up first the general case of the molders, Mr. Brombacher distinctly conveys the impression that the molder Edgecombe, who was taken on after the strike in the Watertown foundry, was used as a pacemaker, was deliberately given unfair and unusual advantages in order to make record times on jobs, and that the records which he did make formed the basis for the times within which other molders were expected to complete those jobs or suffer a disadvantageous comparison. How misleading this conclusion is will be seen by a brief review of all the facts developed on this point.

The testimony shows clearly that neither was Edgecombe made the subject of any time study, nor were any of his records utilized in any way in fixing the premium times on any jobs. On the pommel job which Mr. Brombacher cites, after stating that a time study indicated that a mold could be made in 24 minutes, instead of the 45 to 53 minutes previously taken, and the fact that Edgecombe made 30 of these molds in an 8-hour day, some of them in 10 minutes, he goes on to say that although this result apparently justifies the time study figures it was alleged that Edgecombe's record was not made under normal conditions and that testimony was adduced to show that he did not finish his work nearly as well as others and that his castings were rough.

As far as the conditions being normal is concerned, the evidence shows that the conditions under which it was figured that the work could reasonably be done in 24 minutes were not the same and not intended to be the same as had obtained before. One of the principal purposes of a time study is to improve the conditions where such a study reveals opportunity for improvement. But the testimony does not indicate that Edgecombe was purposely, or with at least the knowledge and consent of the management, allowed any favoring condition which it was not proposed to allow to any molder who might be put upon that job. It is a fact, though not appearing in the record, that after the return of the regular molders from strike one of them was put on the same pommel job and averaged 28 minutes per mold.

Mr. Brombacher is not to be criticised for omitting to mention a fact not in the record and, therefore, not necessarily known to him, but he cannot be so absolved for his failure to notice the fact which is in the record that Edgecombe's pommel castings could not be distinguished from those previously made when an attempt was subsequently made to pick them out. The omission of this point from his account leaves uncontradicted the statement that Edgecombe's castings were rough and therefore inferior, and supports the inference that better time lowered the quality of the output, while its inclusion would have been fatal to both propositions.

The Gun Lever Mold

A somewhat similar omission on his part in the case of the gun lever job has the same effect. He cites the fact that Edgecombe got out in 8 hours a gun lever mold on which the record showed that formerly an average time of 32 hours was taken. This is followed by a review of the testimony of certain witnesses as to the alleged unfair methods followed by Edgecombe, giving the obvious inference that the reduction in the time record made by Edgecombe was due to, and possible only by, the use of unfair methods.

Now molder Hicklin testified that he had made these molds both before and after Edgecombe worked on them; that is, before and after the work had been put upon a premium basis. No time study was made on this job be-

*Ordnance Department, U. S. Army.

cause but few castings remained to be made on this order and it was not expected that any additional orders would be received. For that reason it was decided to base the premium time upon the average of past records on this job. Hicklin stated that he made these molds in 24 hours on the old basis and in 14 hours when working on a premium basis after the strike and after Edgecombe's record of 8 hours had been made. The time within which a premium was earned on this job was 32 hours, and the time in which it was assumed that the job could reasonably be done was 20 hours.

It was particularly brought out, dwelt upon, and emphasized in the testimony, to the finally expressed conviction of at least two members of the committee, that Edgecombe's record of 8 hours had had no bearing, effect or influence upon the times set for this job or upon the record that Hicklin actually made, or that any other molder might make on it. The facts are simply that Hicklin making the mold in the former way and at flat day work took 24 hours. When put on a premium basis with certain unnecessary work omitted, Edgecombe made one in 8 hours, and subsequently under the same conditions Hicklin did it in 14 hours, and in so doing earned a 50 per cent. premium.

Mr. Brombacher omits in his account any reference to the premium times set for this job, or at this point to the fact that the time for supposed accomplishment of the job was so greatly reduced by one of the regular molders. Further along in his article he does mention casually that in the pathetic race to equal Edgecombe's records one molder got his time on this job down to 14 hours, but this reference is so widely separated from the first mention of the case that its bearing is lost. The effect of his presentation is distinctly to give the impression that Edgecombe was used deliberately and with the connivance of the management to obtain abnormal records by means of the most objectionable favoritism and that his records were used or intended to be used to force other men to an equal production.

The Taking of Another Molder's Sand

This impression is directly contrary to the facts as shown above and could not have been conveyed had all the facts testified to and bearing on this point been fairly related. Mr. Brombacher next goes on to allude to a portion of the testimony relating to the discharge of molder Hall for objecting to Edgecombe's taking Hall's sand, which testimony was stricken out as pertaining to matters outside the committee's province. Commenting upon this Mr. Brombacher says "That the arsenal authorities did not waive this point and go into the matter must remain occasion for regret on the part of the general public."

The obvious inference, and I think the only one that the general public will draw from the remark, is that the arsenal authorities were the cause of this testimony being stricken out and were loath to have the point inquired into. Now what are the facts? The molder Hall was upon the stand and Mr. Cain, one of the labor leaders present, asked permission to put a question relative to his discharge, stating that it applied directly to Major Williams, an officer of the Watertown Arsenal. The chairman answered to the effect that Major Williams was not under oath. A member of the committee at once asked that Major Williams be sworn. Another member as promptly said that he would object to any question regarding the discharge of Hall. The chairman sustained the objection on the ground that anything in connection with the discharge of the workman was not a matter within the jurisdiction of the investigation. The member who had asked that Major Williams be sworn then suggested, if Major Williams was not to be allowed to explain that matter, that so much of the testimony of Hall as related to his discharge be stricken from the record. The chairman and the other member of the committee agreed to this and it was so ordered.

This account shows quite conclusively that the failure to go into the question of Hall's discharge was not due in any degree to the arsenal authorities. Major Williams was present and ready to testify, but the opportunity to do so was refused by the unsolicited and positive action of the committee. Mr. Brombacher does not, it is true, say specifically that the arsenal authorities resisted investigation of this question, but his manner of stating the incident quite plainly suggests that they did. The practicability of having a time study of a molding operation made by a man who, though recognized as a time-study expert, was not a practical molder, is also commented upon adversely without taking notice of the fact that the instructions in this case were that a molder should be present to assist the time-study man.

An Unfair Reference to the Machinists' Case

With reference to the machinists' end of the case, the testimony was more voluminous and deserves especial attention in determining the weight to be given it and its effect upon the question at issue. I find in Mr. Brombacher's account of it fewer omissions of essential facts than in the case of the molders, but there seems rather a disposition to consider some of the instances cited by the witnesses as reflecting seriously upon the value of the system and the methods followed in installing it.

Part of this testimony Mr. Brombacher himself classifies as coming under the head of "important if true," and as it was on the following day flatly contradicted by Colonel Wheeler, it may be dismissed without further comment. But in his manner of commenting upon the remainder he gives the impression that it is entitled to the same judicial weight that is properly accorded to the utterances of full experience and mature disinterested judgment. In so doing he is unfair, and again, under the guise of the impartial reviewer, becomes the special pleader. The evidently interested character of such testimony and the fact that it was so plainly inspired by fears rather than facts should, with an unprejudiced commentator, have materially reduced its weight in balancing it against the statements of the officials, who are men of wider experience and without private interests in the matter.

In considering the machinists' testimony as a whole, as well as that of the molders, it should be borne in mind that the officials were engaged in the effort to install new methods and at the same time to keep their plant running. In this work they had to meet and overcome not only the naturally suspicious attitude of the workmen toward a new proposition, but also the more or less covert opposition of the foremen who resented the implication that their own methods were not the best. During the transition period, in the process of education and explanation required, if there were on the part of the employees some instances of misunderstanding of purpose or failure to comprehend entirely some of the new features, it is not to be wondered at.

All the testimony introduced on the part of the employees had for its single aim and object the defeat of the new system. It was given by witnesses who admittedly had had little or no experience with the features particularly objected to, and who manifestly searched their memories for every instance personally or otherwise known to them that would in their opinion discredit either the system or the manner of its installation. The specific instances cited by the machinists were either of such an improbable nature that they merit no serious consideration, or came under the general head of trivial misunderstandings of fact and purpose such as would almost inevitably occur in the process of introducing a new system.

It is not intended to minimize the effect which the latter class would produce in the minds of the men. Their occurrence is a matter of regret, but in view of the number of workmen at the arsenal and the daily administrative duties that the officers had to perform, it is not believed that such misunderstandings were avoidable nor that they constitute any just reflection upon the management. Boiled down, practically all the objections urged by the employees were based upon their fear that the new system presaged for them increased work for the old pay. The testimony on the management side was directed toward showing the economies effected by the new system, the increased wages earned by the workmen, and the reasons why the final result feared by the latter could not occur under the changed conditions.

Important Qualifying Remarks Omitted

Mr. Brombacher gives particular prominence to his statement that the arsenal officials repeatedly announced that "they reserved the right to make time studies and to change the time limits until they were sure that their time study was right," and conveys the inference that such action was disadvantageous to the workmen and justified their fear as to future reduction of their earnings. This

again is another instance of the selection of a particular statement and the omission of other qualifying and explanatory remarks, the inclusion of which would have put the matter in an entirely different light.

These omitted statements were to the effect that only the machine time, that is the speed, feed and depth of cut, was subject to such revision, and that the handling time, the time required by the workman for handling the work and changing or adjusting his tools, when once established, would not be changed. Among the causes that might lead to a change in the machine time were cited changes made in the power of the machines and differences in the character and hardness of the metal being worked upon. If the metal in a particular lot was harder than usual or softer than usual, a corresponding change in the machine time would be made. If with or without changes in the machine it developed that a higher rate of cutting could be used to advantage, the machine time would be changed to accord with the new rate.

Such changes are eminently fair to all concerned, do not cut the earnings of the workman, but, on the contrary, under one of the conditions stated prevents such a cut, and the recognition of the desirability of such action is further evidence, if any is needed, of the fact that the Watertown officials do not regard their system as an inflexible thing to which all practical considerations must be sacrificed. While on this point it is also pertinent to call attention to Colonel Wheeler's statement that the protest of any workman as to the correctness of any portion of a time study would always receive attention and thorough investigation, and that no time would stand which such investigation and demonstration proved to be incorrect.

A Serious Charge Against Arsenal Officials

Mr. Brombacher's conclusion that the arsenal officials are not well fitted for their business, either in training or experience, and do not deal tactfully and kindly with their employees, brings a serious charge against these officers that should not be lightly made. I can find nothing in the records sufficient to support it. Mr. Brombacher apparently bases the first two counts of his indictment upon the ground that the officers in question either have had no experience at all in actually working at the various trades represented at the arsenal, or at least of having had very little of that experience.

I am not one of those who affect to sneer at or deprecate the value of knowledge of any sort, and I readily admit that a practical knowledge of a trade based upon having actually worked at it is a valuable adjunct to the equipment of any one in a managerial capacity. But the duties of management comprise many things that do not and cannot come solely from the ability to perform the work of an operative. As between two men, one of whom has the technical education and the engineering skill required for the management of a plant producing the varied, unusual and complicated machines that the Watertown Arsenal manufactures, but while lacking the actual training of a mechanic has nevertheless had years of experience in observation of and close contact with the work and the men who do the work, and one who knows how to run a machine but has had no time or opportunity to learn the other elements necessary for the job in question, I think any person competent to judge would feel little hesitation in deciding.

The commanding officer of the Watertown Arsenal, Colonel Wheeler, is a man who not only has the advantage of having passed with honor through a school which gave an excellent foundation for an engineering profession, but has for 20 years been engaged upon a branch of engineering work, ordnance engineering, which has comparatively few students in this country. In that work he has, among those who know, achieved the reputation of an ordnance engineer of the first grade. Major Williams, the next in rank, has had the same education and general training as his superior, and while his experience is not so great, measured in years, his duties since he became an ordnance officer in 1898 have been almost wholly in manufacturing plants. The junior officers at the arsenal are younger men with fewer years of experience in the business, but in their cases the shorter experience has been supplemented by practical instruction in the various trades in the shops.

As against these qualifications, which are sufficiently indicated in different parts of the record, no offsetting testimony can be found. The essential value of technical and highly developed engineering knowledge in the management of a plant of this character as compared with only practical knowledge of a trade was well shown in the testimony of one of the foremen, when it was attempted by one of the labor leaders present to make the point that the improvements in machinery and power transmission needed to bring the plant up to a more efficient state might have been worked out equally well by the foreman. The witness, though undoubtedly competent both as a foreman and as a practical mechanic, showed himself wholly unable to determine the simplest data relating to the motors and gearing required. What degree of success would follow the installation of a plant guided by no more technical knowledge than this witness evinced is not a matter of great doubt.

The Arsenal Officers Have Had More to Do with Mechanics than Soldiers

But Mr. Brombacher's criticism of the officers as managers was based also upon the assumption that their military training unfitted them to deal tactfully and pleasantly with mechanics. As to this point he was evidently not aware that all of these officers except the very youngest have had vastly more to do with mechanics than with soldiers, that by far the larger part of their service has been in and about shops where their functions in all that touches the workmen have been purely those of industrial managers.

When the young officers enter the Ordnance Department their first two years are now spent in learning the practical details of their new work. In this period they serve virtually as apprentices of the various trades, learn how to run the different machines and perform each class of work, and are particularly and carefully impressed with the idea that the organization of an industrial plant is essentially different from that which necessarily obtains in an army and that in the direction of the work and in deciding questions that arise the compliance of the workmen must be secured by courteous, fair and considerate methods, with full explanation of reasons when that is necessary to prevent misunderstanding. These facts destroy the assumption that officers having such experience must as a class have less of tact and kindliness than men acting in the same capacity in civil life.

Judging from Mr. Brombacher's own remarks when testifying before the committee at its New York session, civilian managers are not always notable for either of these qualities. As far as these particular officers are concerned there is nothing in the record to justify any general charge of unkindly or arbitrary dealing with the employees. Several times in the Boston hearings the question of the treatment accorded employees by the management was brought up and I fail to find any instance where a witness alleged receiving unjust or discourteous treatment.

Civilian Management of Arsenals Has Been Tried

At several points Mr. Brombacher intimates his opinion that a civilian rather than a military control of the arsenals would be a marked improvement. Possibly it is unknown to him that the experiment has already been tried with results that were far from satisfactory. In the earlier existence of the two national armories, those at Springfield, Mass., and at Harper's Ferry, Va., those establishments were at various times under civilian management. Finally, in April of 1841, the civil superintendents at both these places were removed by direction of the President and officers of the Ordnance Department detailed in their places. In the following August a board of three citizens was appointed to investigate the conditions and management of the Springfield Armory and report their findings and recommendations. Their report is published in Document No. 207 of the House of Representatives of the Twenty-seventh Congress, second session. It revealed a looseness and extravagance of management under the civilian head that called for drastic reforms. Their first recommendation was couched in the most emphatic terms, as follows:

> They deem it of primary importance to have the armory under the direction of the Ordnance Department. Such an arrangement will insure a permanent and capable superintendent, over whom

the department can exercise a military control, and who will be responsible in the penalty of his commission and his reputation as an officer for the faithful observance of all the regulations established by the department. It will also place the establishment beyond the control of local and political influences; give permanence and uniformity to all its operations and insure a just and impartial administration.

It is of the first importance that the superintendent should be a man of science, well acquainted with the best models of the musket, versed in the construction and operation of machinery, educated in habits of punctuality and order, and accustomed to control and direct the labor of others. These qualifications, the board suppose, are more likely to be found in an ordnance officer, who has attained sufficient rank in his corps to be intrusted with such important duties, than among the various applicants from civil life.

Whether the force of these reasons has lost anything in the years since that report was written I will leave to the judgment of your readers. It may at least fairly be questioned whether a civilian management of the Watertown Arsenal would have either undertaken or proceeded with the attempt to secure more efficient results there in the face of the opposition, both industrial and political, which has greeted the efforts of the Ordnance Department in this instance.

Mr. Brombacher's Hostility to Scientific Management

Mr. Brombacher's articles, whenever he alludes to scientific management, reflect a thinly veiled hostility to that phrase and a disposition to sarcastic comment upon the ability and intelligence of the efficiency engineers who have been most largely engaged in installing it. When it is remembered that Mr. Brombacher is himself an efficiency engineer, with his own brand of management, it is not to be wondered at that he is led, perhaps unconsciously, to voice the effect of the competition in this field.

In his exaltation of practical knowledge at the expense of technical skill and training, as evidenced particularly in his New York testimony, he strikes a very seductive note and one that is shrewdly calculated to attract a considerable following in the industrial world. The man who lacks a technical education likes to be told that the knowledge that he does possess is really the most valuable and forms, when supplemented by his native common sense, a better equipment for his work than mere education can give. He is naturally inclined to perceive great acuteness and ability in the man who tells him such agreeable things.

If this flank attack should prove successful in clearing the competitive field of the more prominent and successful efficiency engineers, not to mention the technical men now in charge of the arsenals and other industrial enterprises, a larger opportunity would be created for the employment of those practical men whose abilities have not perhaps heretofore received proper recognition in the way of actual engagements. In this redistribution Mr. Brombacher would not, of course, suffer from his prominence as the leader and proponent of the new dispensation.

Why the Taylor System Was Selected

I hold no brief for Mr. Taylor nor any other advocate of scientific management. He and they can defend themselves, their systems and their writings. I am, however, concerned with the Taylor system in its application at the arsenals. It was selected after study and investigation as being the one that in both theory and actual results had most to support it. Aside from the principles upon which this system is based, it has at least one merit, possessed by few if any others, that commends it to my mind. It is a system completely worked out, in which every detail necessary has been carefully and painstakingly investigated and developed, so that in installing it one is not at a loss as to how to do this or that.

It is easy to enunciate general principles, but quite another thing to work out and fit together all the details, big and little, which must be determined before the machine or scheme is a practical working thing. That Mr. Taylor and his co-laborers have done. Under his system nothing is accepted as a fact until patient and accurate investigation and experiment have proved it to be such. Mr. Brombacher seems to think that such investigation is a useless refinement, is the mark of the faddist and theorist and that all problems of mechanical work can readily be solved by practical experience and common sense.

I would as unhesitatingly accept the result of a practical demonstration as against a theory as Mr. Brombacher himself, but I should first wish to be sure that the practical demonstration was correctly made. And it is precisely to that point that scientific management is directed. It proposes to eliminate as far as possible all guesswork, all precedents which have no better foundation than custom, limited personal experience and all methods that do not stand the acid test of thorough experiment. Too many methods, processes and beliefs have been accepted and followed because no one has taken the trouble to investigate them carefully and determine whether they really are the best. If there is one way to accomplish a purpose better than all others, and when I say better I mean better for all concerned, surely there is no sane objection to ascertaining that way and securing all the advantages of its use.

The Results of the Experiment at Watertown

The installation of scientific management at the Watertown Arsenal was avowedly an experiment. Each feature as put in was placed on trial, to remain or be cast out as the trial showed it to be good or bad. So far as the experiment has gone there, the actual results show a smoother flow of work through the shops, a large net saving to the Government in the cost of work done there and materially larger earnings for those men who have gone upon the premium basis. These conditions do not reveal any cause for alarm or opposition on the part of any one immediately concerned.

The Chief of Ordnance, General Crozier, has declared, both to the committee and publicly, that he considers a satisfied body of employees absolutely necessary for efficient production and that it is not his purpose to continue in effect any system, or any feature of a system, which trial shows to result in the permanent dissatisfaction of any considerable portion of the employees working under it. It would seem as though this declaration, supported by numerous other statements evidencing the purpose to give the employees a square deal both now and in the future, removes all reasonable ground for opposition until at least the stage of experimentation is past.

Mr. Brombacher concludes his articles on the Watertown hearing with the statement that it is not clear how the report of the committee can well avoid charging the arsenal officials with injudicious methods of application as regards the system and somewhat arbitrary treatment of the employees, with a very possible recommendation that civilians be placed in charge of manufacturing arsenals. The propriety of publicly forecasting the action of the committee on the ground that a résumé of the case permits of only one conclusion may very well be questioned. The publicity of such a prophecy, in the event that the report when rendered disappoints the general expectation thus aroused, would tend to place the committee on the defensive and create in the minds of those who had accepted Mr. Brombacher's conclusions a doubt as to the justness of the findings which would be exceedingly unfair to the members. The committee has devoted so much time and labor to the matter and evinced in so many ways its desire to ascertain the exact facts and all the facts that it is entitled to an unprejudiced consideration of its final report.

Pittsburgh Steel Company Furnace Contracts

Contracts for the equipment for the two new blast furnaces to be built by the Pittsburgh Steel Company at Monessen, Pa., are being placed by the Garrett-Cromwell Engineering Company, Cleveland, Ohio. A contract for four blowing engines of the cross-compound steeple type has been placed with the Southwark Foundry & Machine Company, Philadelphia. The Allis-Chalmers Company, Milwaukee, Wis., has been given the contract for four 15,000,000-gal. pumping engines. Work on the new stacks will be started as soon as the weather permits.

The foundry of J. J. Harpel, manufacturer of stoves and light iron castings, Macungie, Pa., was entirely destroyed by fire February 2. All patterns, flasks and general equipment were destroyed, the total loss being $10,000. The plant had just been rebuilt, having been badly damaged by fire a year ago. Mr. Harpel has not decided whether he will again rebuild.

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Labor Chaos Created by Legislation

Labor conditions in Massachusetts, especially in their relation to recently enacted and proposed laws, are of unusual interest at this time. The 54-hour law for women and children has been discussed in detail. A movement is in progress in the Legislature to establish a commission to investigate the question of a minimum wage for women and children, on the theory that the State has the power to determine the lowest wage which an employer can legally pay. Many good lawyers believe, however, that an act creating such a limitation would be unconstitutional. The government has the undisputed power to enact laws which have to do with the health of women and children, but the contention is made that this power does not include the matter of wages. If some women and children are underpaid, so are some men. It would be difficult to rid such a law of the charge of class legislation.

What some workmen affected think of the national eight-hour law is shown at the works of the Fore River Shipbuilding Company, Quincy, Mass. Some 300 draftsmen went on what was practically a strike because, being compelled to work under this rule, they were deprived of their Saturday half holiday. The contract for the new battleship to be built at this yard for the United States Government provides that no person may be employed more than eight hours in a day, and therefore that length of workday must prevail six days a week. The men cannot work five days of nine hours each and three hours on Saturday morning, and much dissatisfaction has been expressed by the very persons whom the law is presumed to benefit.

A great deal of discussion has arisen from the cutting down of legal working days in industrial plants, for it strikes many individual works. The length of a working day would have been reduced as a matter of evolution had there never been any legislation. One employer after another would have taken a step forward in this direction, and others would have followed. In fact, employers have from time to time gone ahead of legislative action and reduced working hours without decreasing the weekly earnings of their people. Occasionally some manufacturer takes very radical action in reducing working time, in the belief that he is establishing a schedule which will work out to the benefit both of himself and his employees. Such a plan has just become operative in the shops of the S. A. Woods Machine Company, Boston, manufacturer of wood-planing machinery. On January 19 Frank F. Woods, president of the company and owner of the business, posted the following notice in his works:

> Believing that the shortening of the working hours will not necessarily lessen the amount of production, and recognizing the Saturday afternoon half holiday, the management announces that beginning with this week, January 15-20, the works will hereafter be operated fifty hours weekly. This plan will be made a success, we anticipate, through the same attention now existent and the sincere co-operation of each and every one. It is understood that the former day rate of pay will in no instance be lessened and that for fifty hours' work fifty-four hours' pay will be made. This necessarily increases the rate per hour, but nets for the week the same as formerly.

This action may be pronounced extreme, but it was taken after many months of consideration, and in the belief that the additional cost would be more than made up in increased efficiency. The men in these shops, 300 in number, are given an increase in hourly wage to compensate for the decrease in working hours,

so that their weekly pay envelopes contain as much money as if the change had not been made.

The case is particularly interesting as the antithesis of the situation at Lawrence. In that instance the employers were forced by the State to reduce their working hours, and the operatives attempted to force them to make a compensating increase in the hourly wage. Advances in wages should always be governed by economic considerations. Decreases in working hours should result from the same sound influences.

Railroad Responsibility for Rail Conditions

The last step in the steel rail controversy—bringing together in conference the presidents of the leading railroads of the country and the presidents of the companies manufacturing rails—should yield larger results than any other action taken in all the years it has waged. The issues at stake have grown in gravity and both sides are seeing, as they have not hitherto, that the interests of a third party, the traveling public, have come to exceed those of either railroads or rail makers. It has been a popular thing to make an outcry about defective steel mill practice. Some of the railroads' representatives have turned this fact to account in the scores of sensational articles that have been written first and last since the steel industry passed so largely into the hands of great corporations. The other side of the story—the responsibility of the railroads for the character of the steel entering into rails in recent years—came squarely under the public eye in the testimony given by President Farrell at Washington in the investigation of the Steel Corporation. That utterance drew the lines in the contest more sharply than ever. It brought out plainly that while there are almost as many rail specifications as there are large railroad systems in the country—a diversity for which the railroads and not the steel companies are responsible—there has been agreement in one tendency, namely, the attempt to secure longer rail wear by pushing the carbon content beyond the point of safety.

What a given section of steel of a given chemical composition will safely stand is known alike to railroad and steel works engineers. There is no mystery about it. Nor is it any secret that steel cast into ingots has in that initial form certain weaknesses which inhere in the very process of changing molten steel into a solid mass. Some of these can be partly corrected, or made wholly incapable of doing harm, by what is done after the making of the ingot. A large discard would reduce the number of rail breakages, but the amount of discard has come down to a question of dollars and cents, as has happened also with the wheel question, and the railroads, while protesting that they want to put safety above every other consideration, have shown themselves very insistent bargainers.

That more will come of the present conference effort than of those that have preceded, appears from the way in which at length the responsibility for rail service is being brought home to the railroads. In his report on the Manchester, N. Y., wreck, James E. Howard, whose rail investigations under government auspices have been so important, emphasized the fact that "current railroad practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal." The point has about been reached, it would seem, at which the railroads, which have long prescribed for the rail makers, will in turn find another authority prescribing for them. The statements of President Farrell and Mr. Howard have raised an issue of grave public concern which the State and National commissions cannot well ignore.

Tariff Maxims and Tariff Facts

It is very evident from the sort of questions asked at the tariff hearings in Washington that in the equipment of a latter-day statesman a knowledge of tariff theory and practice does not bulk large. The idea seems to prevail among the successors of the tariff giants of two or three decades ago that there is a fixed cost for steel products abroad and a fixed cost at home, and that the tariff is designed to cover the difference. The new tariff statesmanship at Washington also conceives of the tariff as something added to the foreign price to make the domestic price. Hence the common reasoning which crops out of the Senate Finance Committee hearings, that if the tariff is reduced the domestic price will thereafter be lower by the amount of the reduction.

For example, the machine tool manufacturers were asked last week if their industry would not be helped by the lowering of the duty on pig iron. It was to be expected that Congressmen would need to be told of the very small figure cut by the pig iron cost entering into a machine tool, in comparison with the high total cost of the labor entering into its production, but we are hardly prepared for the seeming belief that machinery and pig iron prices bear a fixed relation to each other and to the tariff on pig iron. The present duty on pig iron is $2.50 a ton. The Underwood proposal of 8 per cent. ad valorem would yield a duty of about $1 a ton on the present price of English foundry iron. On the pig iron for a machine weighing, say, 1000 pounds, the reduced duty of $1.50 on pig iron would represent a reduction of 70 cents—a somewhat microscopic item on a machine costing, say, $200 to $300.

It might bother one not a tariff theorist to figure the relation between the pig iron duty and pig iron prices when the pig iron market in this country in recent years has shown a fluctuation of $10 a ton in a single year. The "advantage" to the pig iron consumer of a $1.50 reduction in duty thus has very much of a sliding scale quality. In addition to enlarging somewhat the sphere of foreign irons on both coasts, and occasionally checking advances in domestic pig iron in highly prosperous times, an important effect of the ad valorem duty proposed would be to raise the duty on ferromanganese and add by so much to the cost of American steel.

Surprising also are some of the notions lodged in Congressional minds as to the fixedness of domestic costs. One witness before the Senate Committee told of a steel billet price of $29 a ton, at a time some years ago when billets were being imported from Germany. Being asked whether the home manufacturer at that time had a profit of $10 a ton on billets he replied that this was certainly the case, since billets had been sold in this country some years before at $14 a ton. The reply was taken as conclusive of the enormous profit in steel making, though not a word was said as to the cost of labor, ore, coke and all else that entered into the production of a ton of steel in the depressed years when billets sold at Pittsburgh at two-thirds of a cent a pound.

Fairly descriptive of the present day type of tariff statesmanship is the mot of a former President on the propensity that showed itself strong even then to study maxims rather than markets.

Frederick T. Gates has written a 32-page pamphlet entitled "The Truth About Mr. Rockefeller and the Merritts." It is about as complete an answer as could be asked to the testimony concerning the Merritt-Rockefeller controversy brought out in the Stanley Committee hearings. The appearance of the Merritts before the Stanley Committee has already been characterized in these columns. It well illustrated how politics has been played in the work of that committee in the effort to create prejudice against large corporations and men of large means. The reading of the Gates pamphlet shows that its writer has no mean literary style, added to conspicuous ability to marshal facts in the most effective way.

Percival Roberts on Steel Works Labor Conditions

Percival Roberts, Jr., a director of the United States Steel Corporation, formerly at the head of the Pencoyd Iron Works of A. & P. Roberts & Co., Philadelphia, defended the labor record of the Steel Corporation before the Stanley Committee at Washington February 14. He said that his experience had been that it is very easy to induce men to take 12-hour jobs, but difficult to get the 12-hour men to go back to 10-hour jobs. He had seen blast furnace men who would rather be laid off than return to the 10-hour workdays.

To Chairman Stanley's inquiry, "Did you ever consider the relations of the 12-hour employee to his family and to society?" Mr. Roberts replied that that was an academic question. His attention being called to Commissioner of Labor Neill's report, the witness said that the story would have been quite different if Commissioner Neill had confined his conclusions to the Steel Corporation plants.

"I have no apology to make for the United States Steel Corporation regarding its relations with its employees," he said. "I declare that the corporation has done more to better the condition of steel workers than the combined efforts of the employees themselves in the entire nineteenth century. I also declare the corporation has done more than any of its competitors to ameliorate the conditions of the employee."

Advocating the placing of labor unions under Government control, Mr. Roberts said:

"I see no reason why men should not combine to dispose of their labor just as men combine to use capital, provided that both are under Government control, and that full liability is imposed on labor organizations for all their undertakings, and that neither side has any monopolistic tendencies. The difficulty with labor organizations is that their first requirement is monopolistic. They demand the closed shop, which is a monopoly, and there is no law in this country to prevent the closed shop. Neither is there any law imposing liability upon labor unions regarding contracts. The average labor union is in no sense an American institution. The idea is imported and has no place in the institutions of this country."

Mr. Roberts made an exception of railroad labor organizations which, he said, were entirely different from the manufacturing organizations.

Mr. Roberts and Attorney D. A. Reed, representing the Steel Corporation, urged the members of the committee to visit steel plants and see the actual labor conditions, saying that more could be learned in two days in this way than from two weeks of testimony. Chairman Stanley approved the idea, but suggested that the members pay their own expenses, as he did not want to ask the House for more than the $34,000 already spent on the investigation.

The Merchants' and Manufacturers' Club of Elwood, Ind., will celebrate this year the twentieth anniversary of the establishing in that city of the plant of the American Tin Plate Company. William McKinley, then Governor of Ohio, made the principal address at the opening, September 13, 1892.

Pittsburgh and Vicinity Business Notes

The report that the Follansbee Brothers Company, Pittsburgh, operating an open-hearth steel works and sheet and tin plate mills at Follansbee, W. Va., will double the size of its plant is absolutely untrue. The company has a two-high bar mill, and will add a reversing engine, so that the mill can be reversed instead of operating only one way, as at present. The contract for the engine will be placed within the next week or two.

Niles furnace of the Carnegie Steel Company at Niles, Ohio, is now being made ready for blast. It has been idle for three years or more. This will make a total of 52 of the 59 blast furnaces of the Carnegie Steel Company in operation.

Plans for a sewerage disposal plant for Connellsville, Pa., have been completed by Chester & Fleming, consulting engineers, Pittsburgh, Pa., and will be presented to the State Department of Health of Pennsylvania for approval. The plant will consist of a pumping station equipped with electrically driven centrifugal pumps, Imhoff tanks, sprinkling filters and secondary settling basins and will treat all of the sewage of the borough of Connellsville.

No. 9 pipe mill at the plant of the Youngstown Sheet & Tube Company, Youngstown, Ohio, started up recently after being idle about four months. It makes 10 to 20-in. pipe and is working on a large order for 17-in.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order from the Edison Electric Illuminating Company, Brooklyn, N. Y., for seven rotary converters and twenty-one rotary transformers, in all about 10,000 hp. capacity; from the New York Edison Company two 4,000 hp. converters and five 4,000 hp. rotary converters, and from the Long Island Railroad four rotary converters of different types, of 2,000 hp. each. These orders are among the largest placed this year in electric equipment.

The Manganese Steel Rail Company has about completed the building of its new plant at Braeburn, Pa. Nearly all the equipment has been installed, and the company expects to commence operations about March 1 in the manufacture of chain and small special forgings.

The Pittsburgh office of the Snow Steam Pump Company, Oliver Building, has received an order for installing a crank and fly wheel hydraulic pressure pump to operate against 1,400 lb. pressure in the works of the American Bridge Company at Ambridge, Pa.

The Frick & Lindsay Company, dealer in mine and mill supplies of all kinds, will erect a six story warehouse on the north side, Pittsburgh, to be of steel construction. The contract for the structural steel, about 700 tons, has been placed with the McClintic-Marshall Construction Company.

The Concrete Steel Company, of New York City, has leased the building formerly occupied by the Reliance Edge Tool Company at Youngstown, Ohio, and will remodel it. It manufactures reinforcing steel and similar products.

W. Ely Ainge, expert accountant and auditor, is installing an accounting system for the Brier Hill Steel Company, Youngstown, Ohio. He installed the accounting system at the Ohio Works and for a number of other local companies and corporations.

The United Engineering & Foundry Company, Farmers' Bank Building, Pittsburgh, is building for the Algoma Steel Company, Sault Ste Marie, Ontario, Canada, a 32-in. blooming mill with auxiliary tables and transfers and a 8 x 8-in. hot bloom shear.

The Follansbee Brothers Company, Pittsburgh, operating open-hearth steel works and sheet and tin mills at Follansbee, W. Va., has decided to build another 30-ton open-hearth furnace, which will be installed as a spare furnace. The plant has two 30-ton furnaces, which have been in operation for about four years, and one or both will probably be shut down in the near future to be rebuilt. An addition of about 150 x 250 ft. will be built to the open-hearth building to accommodate the new furnace. An automatic conveyor will also be installed to carry billets from the hammers to the sheet bar mill. No other improvements are contemplated at present.

Moorhead, Brother & Co., Inc., Pittsburgh, manufacturers of plates and iron and steel skelp, have recently

made some extensive improvements to the 100-in. plate mill by which its capacity has been considerably increased.

The William B. Pollock Company, Youngstown, Ohio, has received a contract from the Shenango Furnace Company, Sharpsville, Pa., for furnishing a new hearth jacket, furnace mantel and shell for the No. 3 furnace. The top, which was new a few years ago, is to be dismantled and replaced after the new shell has been erected.

The Pennsylvania Machinery & Equipment Company, Oliver Building, Pittsburgh, has been appointed Eastern agent for George J. Stocker of St. Louis, manufacturer of induced and natural draft towers.

The Phillips Sheet & Tin Plate Company, operating sheet and tin plate mills at Weirton and Clarksburg, W. Va., and Steubenville, Ohio, has sold $1,000,000 first mortgage, sinking fund 5 per cent. bonds to the Bank of Pittsburgh. The bank has disposed of one-half of the issue, and is offering the remainder at 97½ and interest. The bonds are redeemable at 102½ and interest on and after February 1, 1917. Sinking fund requirements provide for $100,000 per annum. The proceeds are to be used in caring for improvements and extensions and to complete the purchase of the Pope Tin Plate Company and its properties at Steubenville, Ohio.

The motive power department of the Pennsylvania Railroad has given its Juniata shops at Altoona, Pa., an order for the construction of 42 locomotives, comprising 18 large freight engines and 24 shifters.

The Fort Pitt Bridge Works, Pittsburgh, has purchased a large Thomas automatic spacing table with multiple punch from the Standard Bridge Tool Company, Pittsburgh, Pa. The table will automatically handle four 8 x 8-in. angles, 90 ft. long, at one pass, or two narrow plates up to 35 in. wide, or one wide plate. The trailer is designed with low rails, permitting the operators easy access across for placing the material on the rollers. The punch will be equipped with all the appliances for gauging angles in punching, levers for operating the gags, etc. The gags are of special design to permit quick adjustment.

The Neville Iron Company, Pittsburgh, has made application for a charter of incorporation, to deal in iron and steel scrap and other materials. The incorporators are R. H. Aaron, James M. Clark and Clarence McKenney, all of Pittsburgh.

The Riverside Bridge Company, Martins Ferry, Ohio, is turning out fabricated steel for the new auditorium building, the new German Bank building and extensions to the Exchange National Bank Building, all of Wheeling, W. Va.

A meeting of the stockholders of the Pittsburgh Steel Foundry will be held in the general offices of the company, House Building, Pittsburgh, April 9, to vote on a proposition to increase the capital stock from $400,000 to $1,000,000 and to change the corporate title from Pittsburgh Steel Foundry to Pittsburgh Steel Foundry Company. President Stewart Johnson states that much of the additional capital will be used in making large extensions to the plant at Glassport, Pa., probably increasing the capacity about 50 per cent. It makes a general line of steel castings and is running practically full.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has re-elected directors as follows: C. E. Blue, L. V. Blue, C. H. Copp, F. DuP. Thompson, Henry M. Russell, Jr., George A. Laughlin and B. W. Peterson. The directors organized by re-elected the following officers: C. E. Blue, president; L. V. Blue vice-president; H. S. Bradley, secretary; F. DuP. Thompson, chief engineer; Hullihen Quarrier, treasurer.

Among contracts recently secured by the Riter-Conley Mfg. Company, Pittsburgh, are the following: A 750,000-cu. ft. gas holder, for J. D. Shattuck, East Braintree, Mass., consisting of a steel tank 122 ft. diameter and 25 ft. deep, three-lift holder and guide frame of 15 columns, 76 ft. high; a 3,000,000-cu. ft. gas holder for the Philadelphia-Suburban Gas & Electric Company, Chester, Pa., consisting of a steel tank 184 ft. diameter and 33 ft. deep, four-lift holder and guide frame of 24 columns, 132 ft. high; 300 tons of structural steel work for the Aluminum Company of America's plant additions at New Kensington, Pa.; 1000 tons for the new plant to be erected by the Eastman Kodak Company at Rochester, N. Y.; three 12 x 75-ft. Steinbart gas washing towers for the Bethlehem Steel Company's blast furnace G at South Bethlehem, Pa.

At a meeting of stockholders of the Pennsylvania Engineering Works, New Castle, Pa., the old board of directors and officers were re-elected. Edward King is president and treasurer; E. W. Beadle, vice-president and general manager; and Charles L. Baldwin, secretary. The company has considerable work in its shops, the largest contract under way at present being the building of two blast furnaces for the Bethlehem Steel Company, South Bethlehem, Pa.

The Bessemer Gas Engine Company, Grove City, Pa., recently put on the market a new type of oil engine for which it is being favored with large orders from California and the Southwest for irrigation purposes.

The Star Furnace Company, Jackson, Ohio, will completely rebuild its blast furnace and will soon place contracts for stock bins, boilers, cast house, pumping machinery, steam piping, etc.

The Youngstown Bronze & Iron Foundry Company, Youngstown, Ohio, has re-elected its old officers as follows: Grant S. Jones, president; John W. Wright, vice-president; Fred C. Noll, secretary and treasurer, and J. Watson Long, manager. The company reports a fair amount of business on its books.

The sixth annual convention of the United Sons of Vulcan will be held in Youngstown, Ohio, in May. This organization is composed of puddlers who withdrew from the Amalgamated Association some years ago.

The War Department has recently placed with Tate, Jones & Co., Inc., Pittsburgh, several orders for oil burners and oil burning furnaces for heat treating and forging use in the smith shop of the Watertown Arsenal.

Personal

William E. Hartman, gas engineer of H. Koppers, builder of by-product coke ovens, Joliet, Ill., has returned from Europe. His stay of some two months was for the purpose of making a study of the latest improvements in by-product systems, in the course of which he visited the different Koppers coking plants in Germany, France, Austria and England.

Charles F. Rand, president of the Spanish-American Iron Company, is in Cuba.

C. P. Perin, New York, who has been in England for a few weeks will return in March.

William McConway, president of the McConway-Torley Company, Pittsburgh, manufacturer of railroad equipment, was given a dinner at the University Club in that city February 14, by about 200 of his friends, the occasion being the seventieth anniversary of his birth. He was presented with a loving cup and plate suitably inscribed.

John H. Lloyd, formerly superintendent of the forging department of the Columbian Hardware Company, Cleveland, Ohio, has become connected with the Studebaker Corporation, South Bend, Ind., as superintendent of its wagon forging department.

H. C. Johnson, foreign representative of the Gisholt Machine Company, Madison, Wis., will return to Europe February 24 after a short stay in this country.

W. E. Corey has been elected a director of the International Smelting & Refining Company, succeeding Adolph Lewisohn.

W. S. Chase, general sales manager of the National-Acme Mfg. Company, Cleveland, Ohio, will sail from New York February 24 for a several weeks' business trip through Europe.

Coleman B. Ross, formerly with the Linde Air Products Company, is now connected with the Pittsburgh office of the Independent Pneumatic Tool Company, manufacturer of Thor pneumatic tools.

The Snow Steam Pump Company, Buffalo, N. Y., has been awarded the contract by the city of Flint, Mich., for a 12,000,000-gal. horizontal cross compound pump, condensing opposed type, for waterworks service.

The blast furnace of the Carnegie Steel Company, at Niles, Ohio, shortly to be blown in, will be in charge of Superintendent M. J. Scammell, who has been assistant to Superintendent Barrett at the Ohio works of the company.

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"I have no apology to make for the United States Steel Corporation regarding its relations with its employees," he said. "I declare that the corporation has done more to better the condition of steel workers than the combined efforts of the employees themselves in the entire nineteenth century. I also declare the corporation has done more than any of its competitors to ameliorate the conditions of the employee."

Advocating the placing of labor unions under Government control, Mr. Roberts said:

"I see no reason why men should not combine to dispose of their labor just as men combine to use capital, provided that both are under Government control, and that full liability is imposed on labor organizations for all their undertakings, and that neither side has any monopolistic tendencies. The difficulty with labor organizations is that their first requirement is monopolistic. They demand the closed shop, which is a monopoly, and there is no law in this country to prevent the closed shop. Neither is there any law imposing liability upon labor unions regarding contracts. The average labor union is in no sense an American institution. The idea is imported and has no place in the institutions of this country."

Mr. Roberts made an exception of railroad labor organizations which, he said, were entirely different from the manufacturing organizations.

Mr. Roberts and Attorney D. A. Reed, representing the Steel Corporation, urged the members of the committee to visit steel plants and see the actual labor conditions, saying that more could be learned in two days in this way than from two weeks of testimony. Chairman Stanley approved the idea, but suggested that the members pay their own expenses, as he did not want to ask the House for more than the $34,000 already spent on the investigation.

The Merchants' and Manufacturers' Club of Elwood, Ind., will celebrate this year the twentieth anniversary of the establishing in that city of the plant of the American Tin Plate Company. William McKinley, then Governor of Ohio, made the principal address at the opening, September 13, 1892.

Pittsburgh and Vicinity Business Notes

The report that the Follansbee Brothers Company, Pittsburgh, operating an open-hearth steel works and sheet and tin plate mills at Follansbee, W. Va., will double the size of its plant is absolutely untrue. The company has a two-high bar mill, and will add a reversing engine, so that the mill can be reversed instead of operating only one way, as at present. The contract for the engine will be placed within the next week or two.

Niles furnace of the Carnegie Steel Company at Niles, Ohio, is now being made ready for blast. It has been idle for three years or more. This will make a total of 52 of the 59 blast furnaces of the Carnegie Steel Company in operation.

Plans for a sewerage disposal plant for Connellsville, Pa., have been completed by Chester & Fleming, consulting engineers, Pittsburgh, Pa., and will be presented to the State Department of Health of Pennsylvania for approval. The plant will consist of a pumping station equipped with electrically driven centrifugal pumps, Imhoff tanks, sprinkling filters and secondary settling basins and will treat all of the sewage of the borough of Connellsville.

No. 9 pipe mill at the plant of the Youngstown Sheet & Tube Company, Youngstown, Ohio, started up recently after being idle about four months. It makes 10 to 20-in. pipe and is working on a large order for 17-in.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order from the Edison Electric Illuminating Company, Brooklyn, N. Y., for seven rotary converters and twenty-one rotary transformers, in all about 10,000 hp. capacity; from the New York Edison Company two 4,000 hp. converters and five 4,000 hp. rotary converters, and from the Long Island Railroad four rotary converters of different types, of 2,000 hp. each. These orders are among the largest placed this year in electric equipment.

The Manganese Steel Rail Company has about completed the building of its new plant at Braeburn, Pa. Nearly all the equipment has been installed, and the company expects to commence operations about March 1 in the manufacture of chain and small special forgings.

The Pittsburgh office of the Snow Steam Pump Company, Oliver Building, has received an order for installing a crank and fly wheel hydraulic pressure pump to operate against 1,400 lb. pressure in the works of the American Bridge Company at Ambridge, Pa.

The Frick & Lindsay Company, dealer in mine and mill supplies of all kinds, will erect a six story warehouse on the north side, Pittsburgh, to be of steel construction. The contract for the structural steel, about 700 tons, has been placed with the McClintic-Marshall Construction Company.

The Concrete Steel Company, of New York City, has leased the building formerly occupied by the Reliance Edge Tool Company at Youngstown, Ohio, and will remodel it. It manufactures reinforcing steel and similar products.

W. Ely Ainge, expert accountant and auditor, is installing an accounting system for the Brier Hill Steel Company, Youngstown, Ohio. He installed the accounting system at the Ohio Works and for a number of other local companies and corporations.

The United Engineering & Foundry Company, Farmers' Bank Building, Pittsburgh, is building for the Algoma Steel Company, Sault Ste Marie, Ontario, Canada, a 32-in. blooming mill with auxiliary tables and transfers and a 8 x 8-in. hot bloom shear.

The Follansbee Brothers Company, Pittsburgh, operating open-hearth steel works and sheet and tin mills at Follansbee, W. Va., has decided to build another 30-ton open-hearth furnace, which will be installed as a spare furnace. The plant has two 30-ton furnaces, which have been in operation for about four years, and one or both will probably be shut down in the near future to be rebuilt. An addition of about 150 x 250 ft. will be built to the open-hearth building to accommodate the new furnace. An automatic conveyor will also be installed to carry billets from the hammers to the sheet bar mill. No other improvements are contemplated at present.

Moorhead, Brother & Co., Inc., Pittsburgh, manufacturers of plates and iron and steel skelp, have recently

made some extensive improvements to the 100-in. plate mill by which its capacity has been considerably increased.

The William B. Pollock Company, Youngstown, Ohio, has received a contract from the Shenango Furnace Company, Sharpsville, Pa., for furnishing a new hearth jacket, furnace mantel and shell for the No. 3 furnace. The top, which was new a few years ago, is to be dismantled and replaced after the new shell has been erected.

The Pennsylvania Machinery & Equipment Company, Oliver Building, Pittsburgh, has been appointed Eastern agent for George J. Stocker of St. Louis, manufacturer of induced and natural draft towers.

The Phillips Sheet & Tin Plate Company, operating sheet and tin plate mills at Weirton and Clarksburg, W. Va., and Steubenville, Ohio, has sold $1,000,000 first mortgage, sinking fund 5 per cent. bonds to the Bank of Pittsburgh. The bank has disposed of one-half of the issue, and is offering the remainder at 97½ and interest. The bonds are redeemable at 102½ and interest on and after February 1, 1917. Sinking fund requirements provide for $100,000 per annum. The proceeds are to be used in caring for improvements and extensions and to complete the purchase of the Pope Tin Plate Company and its properties at Steubenville, Ohio.

The motive power department of the Pennsylvania Railroad has given its Juniata shops at Altoona, Pa., an order for the construction of 42 locomotives, comprising 18 large freight engines and 24 shifters.

The Fort Pitt Bridge Works, Pittsburgh, has purchased a large Thomas automatic spacing table with multiple punch from the Standard Bridge Tool Company, Pittsburgh, Pa. The table will automatically handle four 8 x 8-in. angles, 90 ft. long, at one pass, or two narrow plates up to 35 in. wide, or one wide plate. The trailer is designed with low rails, permitting the operators easy access across for placing the material on the rollers. The punch will be equipped with all the appliances for gauging angles in punching, levers for operating the gags, etc. The gags are of special design to permit quick adjustment.

The Neville Iron Company, Pittsburgh, has made application for a charter of incorporation, to deal in iron and steel scrap and other materials. The incorporators are R. H. Aaron, James M. Clark and Clarence McKenney, all of Pittsburgh.

The Riverside Bridge Company, Martins Ferry, Ohio, is turning out fabricated steel for the new auditorium building, the new German Bank building and extensions to the Exchange National Bank Building, all of Wheeling, W. Va.

A meeting of the stockholders of the Pittsburgh Steel Foundry will be held in the general offices of the company, House Building, Pittsburgh, April 9, to vote on a proposition to increase the capital stock from $400,000 to $1,000,000 and to change the corporate title from Pittsburgh Steel Foundry to Pittsburgh Steel Foundry Company. President Stewart Johnson states that much of the additional capital will be used in making large extensions to the plant at Glassport, Pa., probably increasing the capacity about 50 per cent. It makes a general line of steel castings and is running practically full.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has re-elected directors as follows: C. E. Blue, L. V. Blue, C. H. Copp, F. DuP. Thompson, Henry M. Russell, Jr., George A. Laughlin and B. W. Peterson. The directors organized by re-elected the following officers: C. E. Blue, president; L. V. Blue vice-president; H. S. Bradley, secretary; F. DuP. Thompson, chief engineer; Hullihen Quarrier, treasurer.

Among contracts recently secured by the Riter-Conley Mfg. Company, Pittsburgh, are the following: A 750,000-cu. ft. gas holder, for J. D. Shattuck, East Braintree, Mass., consisting of a steel tank 122 ft. diameter and 25 ft. deep, three-lift holder and guide frame of 15 columns, 76 ft. high; a 3,000,000-cu. ft. gas holder for the Philadelphia-Suburban Gas & Electric Company, Chester, Pa., consisting of a steel tank 184 ft. diameter and 33 ft. deep, four-lift holder and guide frame of 24 columns, 132 ft. high; 300 tons of structural steel work for the Aluminum Company of America's plant additions at New Kensington, Pa.; 1000 tons for the new plant to be erected by the Eastman Kodak Company at Rochester, N. Y.; three 12 x 75-ft. Steinbart gas washing towers for the Bethlehem Steel Company's blast furnace G at South Bethlehem, Pa.

At a meeting of stockholders of the Pennsylvania Engineering Works, New Castle, Pa., the old board of directors and officers were re-elected. Edward King is president and treasurer; E. W. Beadle, vice-president and general manager; and Charles L. Baldwin, secretary. The company has considerable work in its shops, the largest contract under way at present being the building of two blast furnaces for the Bethlehem Steel Company, South Bethlehem, Pa.

The Bessemer Gas Engine Company, Grove City, Pa., recently put on the market a new type of oil engine for which it is being favored with large orders from California and the Southwest for irrigation purposes.

The Star Furnace Company, Jackson, Ohio, will completely rebuild its blast furnace and will soon place contracts for stock bins, boilers, cast house, pumping machinery, steam piping, etc.

The Youngstown Bronze & Iron Foundry Company, Youngstown, Ohio, has re-elected its old officers as follows: Grant S. Jones, president; John W. Wright, vice-president; Fred C. Noll, secretary and treasurer, and J. Watson Long, manager. The company reports a fair amount of business on its books.

The sixth annual convention of the United Sons of Vulcan will be held in Youngstown, Ohio, in May. This organization is composed of puddlers who withdrew from the Amalgamated Association some years ago.

The War Department has recently placed with Tate, Jones & Co., Inc., Pittsburgh, several orders for oil burners and oil burning furnaces for heat treating and forging use in the smith shop of the Watertown Arsenal.

Personal

William E. Hartman, gas engineer of H. Koppers, builder of by-product coke ovens, Joliet, Ill., has returned from Europe. His stay of some two months was for the purpose of making a study of the latest improvements in by-product systems, in the course of which he visited the different Koppers coking plants in Germany, France, Austria and England.

Charles F. Rand, president of the Spanish-American Iron Company, is in Cuba.

C. P. Perin, New York, who has been in England for a few weeks will return in March.

William McConway, president of the McConway-Torley Company, Pittsburgh, manufacturer of railroad equipment, was given a dinner at the University Club in that city February 14, by about 200 of his friends, the occasion being the seventieth anniversary of his birth. He was presented with a loving cup and plate suitably inscribed.

John H. Lloyd, formerly superintendent of the forging department of the Columbian Hardware Company, Cleveland, Ohio, has become connected with the Studebaker Corporation, South Bend, Ind., as superintendent of its wagon forging department.

H. C. Johnson, foreign representative of the Gisholt Machine Company, Madison, Wis., will return to Europe February 24 after a short stay in this country.

W. E. Corey has been elected a director of the International Smelting & Refining Company, succeeding Adolph Lewisohn.

W. S. Chase, general sales manager of the National-Acme Mfg. Company, Cleveland, Ohio, will sail from New York February 24 for a several weeks' business trip through Europe.

Coleman B. Ross, formerly with the Linde Air Products Company, is now connected with the Pittsburgh office of the Independent Pneumatic Tool Company, manufacturer of Thor pneumatic tools.

The Snow Steam Pump Company, Buffalo, N. Y., has been awarded the contract by the city of Flint, Mich., for a 12,000,000-gal. horizontal cross compound pump, condensing opposed type, for waterworks service.

The blast furnace of the Carnegie Steel Company, at Niles, Ohio, shortly to be blown in, will be in charge of Superintendent M. J. Scammell, who has been assistant to Superintendent Barrett at the Ohio works of the company.

The Iron and Metal Markets

Prices Tending Downward

Freight Blockades a Serious Feature

Negotiations for 10,000 Cars—Sheets and Tin Plates Weaker—A Good Structural Outlook

The tendency to lower prices for finished steel products continues, and the question before the trade is whether they will sag back to the level from which they were lifted by the remarkable buying of November and early December. It is to be considered that relatively little was done at the higher prices and that a recession of $1 to $2 a ton would be more in name than in fact.

Just how far the easier prices of recent weeks are due to the extremely cold weather and the resulting railroad embargo is not clear. A few weeks will show whether more permanent causes are operating to affect the volume of iron and steel business. The car situation has been a serious problem in a number of districts and the breaking of blockades at the terminals of a number of important systems may be a matter of several weeks.

The possibility of pig iron purchases by the Steel Corporation is still being canvassed. In the past few years the corporation has shipped iron from the Central West to its Eastern plants. Its stocks of pig iron have been steadily reduced, even with the blowing in of additional furnaces, and the question now up is whether to continue this policy and buy a certain amount of iron in the Central West, or buy Eastern iron for the Eastern steel plants.

About 10,000 cars have been under negotiation lately, of which 2750 are expected to be placed this week by the Western Maryland.

Rail orders have taken second place to the important conferences over rail specifications, engaged in by railroad and steel company presidents. Rail breakages in recent zero weather have been heavy and have accentuated the demand for heavier sections and lower carbon steel. There are indications that both these changes will be made in rails intended for the higher latitude lines. The Great Northern's order has been increased to 71,000 tons, of which the Pennsylvania and Maryland Steel companies received 20,000 tons, the Lackawanna Steel Company 20,000 tons, and the Colorado Company 31,000 tons. The first named amount will be rolled from Mayari steel, the price being $30 for 15,000 tons of open-hearth rails and $28 for 5000 tons of Bessemer rails. The Twin City Rapid Transit Railway has bought 4400 tons in the past week and the Clinton & Oklahoma Western Railway 3500 tons. Southern roads are expected to place considerable orders soon.

Bars and plates are commonly on a 1.10c. basis, Pittsburgh, and structural steel has sold at that figure, though some producers of shapes are maintaining 1.15c.

The contrast is marked between plate mill operations at Pittsburgh, where car works demand has insured full running for six weeks or more, and conditions in the East, where mills are on 50 to 60 per cent. schedules.

A cheerful view is taken of the structural situation in the East, where estimates are being made on a large number of good enterprises. The Western Union building in New York, which is to be built in sections, will require 11,000 tons.

The sheet market is weaker than at any time since early December. On desirable specifications No. 28 sheets have sold at 1.80c. at mill. In tin plate the $3.40 basis has been shaded for some time and recent business has been done at $3.25.

The leading wire company is reported to have a larger tonnage on its books than at any time in its history.

Pig iron markets are exceedingly dull, with no immediate prospect of any significant activity. Southern foundry iron is selling at $10.25 for second quarter and the amount of $10 iron obtainable for prompt shipment is not large. Foundry operations throughout the country are on the same unsatisfactory footing that has existed for months and the low prices of castings are causing sharp complaint.

The coke situation has kept consumers on the alert and while the movement has improved somewhat the high prices remain. An Eastern steel company has bought furnace coke at $1.75 and $1.80 and an inquiry has come up for 2500 tons a month for Eastern shipment.

A third inquiry from an Eastern consumer is before the Lake Superior ore trade at Cleveland, though it is not probable that any early contracts will be made for the shipment of this year's Lake ore into Eastern districts, if at all.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Feb. 21, 1912.	Feb. 14, 1912.	Jan. 17, 1912.	Feb. 21, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	$14.85	$14.85	$14.85	$15.50
Foundry No. 2, Valley furnace	13.00	13.00	13.00	13.75
Foundry No. 2 Southern, Cincinnati	13.25	13.25	13.25	14.25
Foundry No. 2, Birmingham, Ala.	10.00	10.00	10.00	11.00
Foundry No. 2, at furnace, Chicago*	14.00	14.00	14.00	15.50
Basic, delivered, eastern Pa.	14.25	14.25	14.25	14.50
Basic, Valley furnace	12.25	12.25	12.50	13.75
Bessemer, Pittsburgh	14.90	14.90	15.15	15.90
Gray forge, Pittsburgh	13.40	13.40	13.40	14.40
Lake Superior charcoal, Chicago	16.00	16.00	16.00	17.50
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh	20.00	20.00	20.00	23.00
Open hearth billets, Pittsburgh	20.00	20.00	20.00	23.00
Forging billets, Pittsburgh	28.00	28.00	28.00	28.00
Open hearth billets, Philadelphia	22.40	22.40	22.40	25.40
Wire rods, Pittsburgh	25.00	25.00	24.50	29.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	15.00	15.00	15.00	15.50
Iron rails, Philadelphia	*15.50*	16.00	16.50	18.00
Car wheels, Chicago	13.00	13.00	13.25	13.00
Car wheels, Philadelphia	12.00	12.00	12.50	14.00
Heavy steel scrap, Pittsburgh	*12.00*	12.25	13.00	14.75
Heavy steel scrap, Chicago	10.50	10.50	10.50	12.50
Heavy steel scrap, Philadelphia	11.75	11.75	12.25	14.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel,	Feb. 21, 1912.	Feb. 14, 1912.	Jan. 17, 1912.	Feb. 21, 1911.
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.25	1.27½	1.27½	1.37½
Iron bars, Pittsburgh	1.25	1.25	1.25	1.35
Iron bars, Chicago	1.15	1.15	1.15	1.30
Steel bars, Pittsburgh	1.10	1.15	1.15	1.40
Steel bars, tidewater, New York	1.26	1.31	1.31	1.56
Tank plates, Pittsburgh	1.10	1.12½	1.15	1.40
Tank plates, tidewater, New York	1.26	1.28½	1.31	1.56
Beams, Pittsburgh	1.10	1.12½	1.15	1.40
Beams, tidewater, New York	1.26	1.28½	1.31	1.56
Angles, Pittsburgh	1.10	1.12½	1.15	1.40
Angles, tidewater, New York	1.26	1.28½	1.31	1.56
Skelp, grooved steel, Pittsburgh	1.12½	1.12½	1.15	1.30
Skelp, sheared steel, Pittsburgh	1.20	1.20	1.20	1.35
Sheets, Nails and Wire,				
Per Pound to Largest Buyers:				
Sheets, black, No. 28, Pittsburgh	1.85	1.85	1.90	2.20
Wire nails, Pittsburgh	1.60	1.60	1.55	1.75
Cut nails, Pittsburgh	1.55	1.55	1.50	1.60
Fence Wire, ann'led, 0 to 9, P'gh.	1.40	1.40	1.35	1.55
Barb. wire, galv., Pittsburgh	1.90	1.90	1.85	2.05
Coke, Connellsville,				
Per Net Ton, at Oven:				
Furnace coke, prompt shipment	$1.75	$1.80	$1.85	$1.45
Furnace coke, future delivery	1.80	1.80	1.70	1.70
Foundry coke, prompt shipment	2.10	2.10	2.00	2.10
Foundry coke, future delivery	2.25	2.20	2.15	2.25
Metals,				
Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	14.50	14.37½	14.62½	12.75
Electrolytic copper, New York	14.37½	14.25	14.37½	12.37½
Spelter, St. Louis	6.55	6.55	6.50	5.45
Spelter, New York	6.70	6.70	6.65	5.60
Lead, St. Louis	3.95	3.97½	4.35	4.27½
Lead, New York	4.00	4.00	4.45	4.42½
Tin, New York	42.87½	44.00	42.50	44.75
Antimony, Hallett, New York	7.37½	7.50	7.65	8.00
Tin plate, 100-lb. box, New York	$3.54	$3.64	$3.64	$3.94

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific Coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in. on one or both legs, ¼ in. and over, 1.10c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.15 to 1.20
H-beams over 18 in.	1.15 to 1.20
Angles over 6 in.	1.15 to 1.20
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909	1.15 to 1.20
Tees, 3 in. and up	1.15 to 1.20
Zees, 3 in. and up	1.10 to 1.15
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909	1.15 to 1.20
Deck beams and bulb angles	1.40 to 1.45
Hand rail tees	1.95 to 2.10
Checkered and corrugated plates	1.95 to 2.10

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 and 10	1.35 to 1.40
Nos. 11 and 12	1.40 to 1.45
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled.

	One Pass.	Three Pass.
Nos. 10 to 12	1.50 to 1.55	.....
Nos. 13 and 14	1.55 to 1.60	.....
Nos. 15 and 16	1.60 to 1.65	1.70 to 1.75
Nos. 17 to 21	1.65 to 1.70	1.75 to 1.80
Nos. 22, 23 and 24	1.70 to 1.75	1.80 to 1.85
Nos. 25 and 26	1.75 to 1.80	1.85 to 1.90
No. 27	1.80 to 1.85	1.90 to 1.95
No. 28	1.85 to 1.90	1.95 to 2.00
No. 29	1.90 to 1.95	2.00 to 2.05
No. 30	2.00 to 2.05	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	1.85 to 1.90
Nos. 12, 13 and 14	1.95 to 2.00
Nos. 15, 16 and 17	2.10 to 2.15
Nos. 18 to 22	2.25 to 2.30
Nos. 23 and 24	2.35 to 2.40
Nos. 25 and 26	2.55 to 2.60
No. 27	2.70 to 2.75
No. 28	2.85 to 2.90
No. 29	2.95 to 3.00
No. 30	3.15 to 3.20

All above rates on sheets are f.o.b Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations:

Corrugated Roofing Sheets Per Square.

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	....	$2.20	23	$2.25	$3.35
28	$1.30	.. 2.45	22	2.40	3.50
27	1.40	2.50	21	2.60	3.85
26	1.50	2.55	20	2.85	4.15
25	1.70	2.90	18	3.80	5.40
24	1.95	3.00	16	4.55	6.25

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, $1.40; galvanized, $1.70. Carload lots, to retailers, annealed, $1.50; galvanized, $1.80. Galvanized barb wire to jobbers, $1.90; painted, $1.60. Wire nails, to jobbers, $1.60.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911:

Butt Weld.

	Steel Black.	Steel Galv.	Iron Black.	Iron Galv.
⅛ and ¼ in.	74	54	68	48
⅜ in.	75	65	69	59
½ in.	78	68	72	62
¾ to 1½ in.	81	72	75	67
2 to 3 in.	82	75	76	69

Lap Weld.

1¼ and 1½ in.	..	..	68	61
2 in.	79	72	72	65
2½ to 4 in.	81	74	74	67
4½ to 6 in.	80	72	73	65
7 to 12 in.	78	68	71	61
13 to 15 in.	55	..	47	..

Butt Weld, extra strong, plain ends, card weight.

⅛, ¼, ⅜ in.	70	60	65	55
½ in.	75	69	70	64
¾ to 1½ in.	79	73	74	68
2 to 3 in.	80	74	75	69

Lap Weld, extra strong, plain ends, card weight.

1½ in.	..	..	66	60
2 in.	76	70	71	65
2½ to 4 in.	78	72	73	67
4½ to 6 in.	77	71	72	66
7 to 8 in.	70	60	65	55
9 to 12 in.	65	55	60	50

Butt Weld, double extra strong, plain ends, card weight.

½ in.	65	59	60	54
¾ to 1½ in.	68	62	63	57
2 to 3 in.	70	64	65	59

Lap Weld, double extra strong, plain ends, card weight.

2 in.	66	60	61	55
2¼ to 4 in.	68	62	63	57
4½ to 6 in.	67	61	62	56
7 to 8 in.	60	50	55	45

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld
2, 2½ to 4 in. Lap Weld

Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.		*Standard Charcoal Iron.*	
1¾ to 2¼ in.	65	1½ in.	48
2½ in.	67½	1¾ to 2¼ in.	50
2¾ to 3¼ in.	72½	2½ in.	55
3½ to 4 in.	75	2¾ to 5 in.	60
5 to 6 in.	67½	Locomotive and steamship special grades bring higher prices.	
7 to 13 in.	65		

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discounts, lowered by two points.

Pittsburgh

PITTSBURGH, PA., February 20, 1912.

There has been a decided shortage of box cars in the Pittsburgh district in the past two weeks or more and it has seriously inconvenienced shippers in making deliveries. The railroads seem unable to deliver cars as fast as they are needed, but if the milder weather contiues the supply will probably improve. The open weather of the past two weeks has already had the effect of increasing specifications. The sentiment in the trade this week is more cheerful, and the belief is strong that not later than March 15 there will be a better buying movement and heavier specifications. There is very little new inquiry for pig iron, with prices ruling only fairly strong. The volume of new business in finished iron and steel is light, but this is mainly because consumers of nearly all kinds of material covered ahead, for the first quarter at least, in December. A feature of the market is the active demand for foundry coke, which has resulted in several makers advancing their prices to $2.40 at oven. The scrap market is dull, with prices lower on some grades. The general situation is not any worse than last week. From the standpoint of sentiment, which sometimes counts for a good deal, it is a little better. No better prices are looked for, however, until new orders and specifications materially improve.

Pig Iron.—What little activity exists is confined mostly to foundry iron, for which there is a fair demand for small lots and prompt shipment. Reported large sales of basic iron in the past week are discredited, and in fact the only buyer of basic iron in this district for some time has been the Pittsburgh Steel Company, which is getting its basic iron from a local interest on an exchange basis of billets for pig iron, and the company has covered its March requirements. A local steel casting interest has bought 200 tons of standard Bessemer iron for March delivery at a price reported slightly under $14, at Valley furnace. Prices of pig iron are weak and not enough is being sold to test the market. We quote: Bessemer, $14; basic, $12.25; malleable Bessemer, $12.75 to $13; No. 2 foundry, $13; gray forge, $12.50, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Steel Billets and Sheet Bars.—The Carnegie Steel Company states that it is still out of the market as a seller of billets and sheet bars and the independent mills are taking what little new business is offered. Practically all consumers of steel are covered by contracts and specifications against them are coming in very freely. As yet there has been no buying for second quarter, consumers holding off until the situation is clearer as to the prices they will get for their finished products. It is reported that 4 x 4-in. open hearth billets, and also open hearth sheet bars, are being offered below $20 for the former and $21 for the latter, the shading not being over 50c. a ton. We quote: Bessemer and open hearth billets, 4 x 4 in., up to 0.25 carbon, $20; Bessemer and open hearth sheet and tin plate bars, $21; forging billets, $28, all at Pittsburgh. Prices of billets and sheet bars at Youngstown are 50c. under Pittsburgh and on very desirable orders $1 under might be done.

Ferromanganese.—There is no new inquiry in this market, consumers being covered, but occasional lots of a carload or two are being sold at $41, Baltimore, at which figure the market is firm. The freight rate to Pittsburgh is $1.95 a ton.

Ferrosilicon.—New inquiry is light, as most consumers are covered through first half and some through all of this year. Prices on 50 per cent. are firm, and sales of about 75 tons are reported at the full price of $70, delivered. We quote 50 per cent. in lots up to 100 tons at $70; over 100 tons to 600 tons, $69, and over 600 tons, $68, Pittsburgh. The lower grades are ruling at about $20 for 10 per cent.; $21 for 11 per cent.; $22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio.

Muck Bars.—The market is very dull and we do not hear of any new sales. Best grades made from all pig iron are quoted at about $28, Pittsburgh.

Wire Rods.—Occasional small lots of open hearth wire rods are sold on the basis of $25, Pittsburgh, but most consumers are covered for some time ahead. Specifications against their contracts are only fair. We quote Bessemer, open hearth and chain rods at $25, Pittsburgh.

Skelp.—The local market is dull, new inquiry being very light. We quote grooved steel skelp at 1.12½c.; sheared steel skelp, 1.20c.; grooved iron skelp, 1.42c. to 1.45c., and sheared iron skelp, 1.62½c. to 1.65c., all for delivery at buyers' mills in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Company has received a formal order from the Norfolk & Western Railroad for 12,000 tons of standard sections for early rolling and the Cambria Steel Company for 3500 tons, also receiving an order for 1000 tons of girder rails from an Ohio traction company. The Carnegie Steel Company is also receiving good sized orders for standard sections for export shipment, and its Edgar Thomson rail mills at Bessemer, Pa., are running to fuller capacity than for some time. No. 1 mill is rolling standard sections, No. 2 is rolling sheet bars and No. 3 mill, which is electrically driven, is making light rails. Last week the Carnegie Steel Company received orders and specifications for very close to 4000 tons of light rails, demand from the coal mining interests being quite active. The company is also booking some good sized orders for splice bars and for its Duquesne rail joints. We quote splice bars at 1.50c. per lb., and repeat quotations on rails: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.25c.; 12 and 14-lb., 1.16c.; 16, 20 and 25-lb., 1.12c.; 30 and 35-lb., 1.10c., and 40 and 45-lb., 1.08c., f.o.b. at mill.

Plates.—The Carnegie Steel Company is well filled up on plates and announces it cannot promise deliveries inside of six weeks to two months. Steel car business has been light, but the Western Maryland order for 2750 cars is expected to be placed this week. The Birmingham Southern Railroad has placed 80 steel hopper cars with the Pressed Steel Car Company, and the Mississippi & Ohio 300 gondolas and 200 steel underframes with the Mount Vernon Car Company. The latter has also an order from the Southern for 500 gondolas. The Wabash is expected to buy 2950 freight cars and 20 passenger cars. Several large water works jobs are in the market but are not far enough along as yet for mention. We quote ¼-in. and heavier plates at 1.10c. for desirable orders and 1.15c. in small lots, f.o.b. at mill, Pittsburgh.

Structural Material.—While a good deal of new work is being figured on and more is coming up, actual contracting is quiet. The Riter-Conley Mfg. Company has taken about 850 tons for a new malleable iron foundry for the General Electric Company at Erie, Pa. About 1100 tons of material for a new steel building for the Canadian Locomotive Company was divided between two Canadian interests. The American Bridge Company has taken about 1500 tons for a deck strand bridge at Lawrence Junction near New Castle, Pa., for the Pennsylvania Lines West, and the Fort Pitt Bridge Works 750 tons for area work for the New York Central Terminal. We quote beams and channels up to 15 in. at 1.10c. to 1.15c. f.o.b. at mill, Pittsburgh.

Sheets.—New buying in sheets is light, but specifications against December contracts have been coming in at a heavy rate last month and this month. A leading maker reports that its specifications this month have been fully as heavy as in the same period in January, which was the heaviest month in specifications in its history. The larger sheet mills are reasonably well filled up for the next two or three months, but some of the smaller mills are not so fortunate and are going after the small amount of new business that is being offered more aggressively, with the result that

prices are weaker than at any time since early December. On usual orders for No. 28 black sheets, most mills are quoting 1.85c. at mill, but on desirable specifications 1.80c. has been done. Leading sheet mills continue to operate to about 85 per cent. of capacity.

Tin Plate.—The heavy consumers of tin plate, such as the can makers and meat packers, are specifying at a fairly good rate against contracts, but new buying is only in small lots. The American Sheet & Tin Plate Company is now operating close to 90 per cent. of capacity, while some of the leading independent mills are operating practically full. We quote 14 x 20 coke plates at $3.30 up to $3.40, prices depending on the size of the order and deliveries wanted.

Iron and Steel Bars.—The larger makers of steel bars state that new orders are only fair, but specifications in the last week or 10 days have shown slight betterment. Several mills are going after new business more aggressively and prices have eased off to some extent. It is believed that if the mild weather of the past two weeks continues specifications for both iron and steel bars will soon show material betterment. The steel car builders are taking bars under their contracts at a fairly satisfactory rate, and a good part of the tonnage being shipped out by the mills is for this class of consumers. We quote steel bars at 1.10c. to 1.15c. for delivery over the next two or three months and iron bars at 1.25c., f.o.b. mill, Pittsburgh.

Hoops and Bands.—New business is only in small lots for prompt shipment and specifications are coming in at only a fairly satisfactory rate. We quote steel bands at 1.10c. to 1.15c., depending on the order, extras as per the steel bar card and hoops at 1.25c., f.o.b. Pittsburgh.

Rivets.—Some improvement in new demand for rivets is reported and several makers state that specifications, particularly from the railroads, have been better in the past two weeks. We quote structural rivets at 1.50c. and boiler rivets at 1.60c., f.o.b. Pittsburgh, but on desirable orders structural rivets are selling at 1.45c. and boiler rivets at 1.55c.

Shafting.—Specifications from the automobile builders have been a little heavier in the past week, but the trade is quiet. We quote cold rolled shafting in carload and larger lots at 65 per cent. off and in small lots at 60 and 5 per cent. off, delivered in base territory.

Railroad Spikes.—Nearly all the leading railroads covered their requirements on spikes for first quarter and first half of this year last December when prices were at their lowest point, so that new buying is light. We quote railroad spikes in base sizes at $1.40 per 100 lb. in carload and larger lots, but most contracts on the books of the makers are at $1.35 or lower per 100 lb.

Merchant Steel.—One leading maker reports that specifications so far this month are ahead of the same period in January. New orders are only fajr. Stocks carried by jobbers are lower and these will have to be replenished soon in expectation of the opening up of spring trade.

Spelter.—The market has been firmer in the past week with spelter scarce, the best grades being quoted at 6.55c., East St. Louis, equal to 6.67½c., Pittsburgh.

Wire Products.—The American Steel & Wire Company reports that actual tonnage on its books at present is heavier than ever in its history and that specifications against contracts placed by jobbers some time ago are coming in very freely. Other leading makers of wire and wire nails make the same report and the wire trade is referred to as being fairly satisfactory. Comparatively little new business has been taken since the last advance of $1 a ton in prices, nearly all consumers being covered at lower prices. We quote wire nails at $1.60; cut nails, $1.55; galvanized barb wire, $1.90; painted, $1.60; annealed fence wire, $1.40, and galvanized fence wire, $1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—A very large number of oil and gas line projects are under way and with the continuance of the present mild weather some of these are expected to develop into actual inquiries in the very near future. The Philadelphia Company of this city has placed contracts for upward of 7000 tons of iron pipe and oil country goods, the business being divided between Wheeling, Pittsburgh and Youngstown mills. New orders for merchant pipe continue quite heavy, several mills reporting that actual orders booked so far this month are in excess of the same period in January. While low prices continue to be made on line pipe, some recent low quotations have been withdrawn and the market in this respect is in better shape. It is stated that discounts on iron and steel pipe are being quite well maintained.

Tubes.—Makers report specifications are being received from the railroads on the large contracts for boiler tubes placed in December, but new buying is rather light. The general demand for merchant tubes is quiet and prices are very low. In fact several leading makers of merchant tubes report they are practically out of the market as sellers, being unable to meet the low prices ruling.

Iron and Steel Scrap.—Local consumers of scrap bought heavily some time ago and are taking in material at a fairly satisfactory rate. We note, however, that one consumer shut off shipments two weeks ago and is still declining to take in any material. The scrap in the list of the Pennsylvania Railroad Lines East which closed last week went largely to consumers, mostly in the East. In fact, the list of the Pennsylvania Railroad Lines East does not cut much figure in the local scrap market, as the Pitcairn, Pa., shops are the only ones from which shipments can be made into this territory, although occasionally a small amount of scrap from Altoona comes to Pittsburgh. We note that prices on heavy steel scrap, borings and turnings are lower, sales of ordinary grades of heavy steel scrap having been made as low as $12 a ton, delivered, Sharon, Pa. We note sales of 2000 to 2500 tons of heavy steel scrap at $12.25 to $12.50, delivered, Monessen, Pa., and South Side, Pittsburgh; also a sale of 800 tons of heavy steel scrap at $12, delivered, Sharon, Pa.; also about 1000 tons of borings at $9.25 and also 500 to 600 tons of turnings at $9.75. Dealers quote as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$12.00 to $12.50
No. 1 foundry cast	12.25 to 12.50
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	10.75 to 11.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	9.00 to 9.25
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	20.50 to 21.00
Steel car axles	16.00 to 16.25
Locomotive axles	22.00 to 22.50
No. 1 busheling scrap	11.00 to 11.25
No. 2 busheling scrap	7.00 to 7.25
Old car wheels	12.00 to 12.25
*Cast iron borings	9.00 to 9.25
*Machine shop turnings	9.50 to 9.75
†Sheet bar crop ends	13.75 to 14.00
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	12.50 to 12.75
Heavy steel axle turnings	9.75 to 10.00
Stove plate	9.00 to 9.25

* These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
† Shipping point.

Coke.—It is believed that foundry coke is about the most active item on the whole list at present. There is a scarcity of foundry coke for prompt shipment, and we note that the Bessemer Coke Company and several other makers have put prices of standard 72-hr. foundry coke for forward delivery on contracts at $2.40 per net ton at oven and are holding firmly. We note a sale of about 4000 tons of standard grade furnace coke at $1.75 to $1.85. A leading Eastern steel works that has been buying spot coke right along has an inquiry out for 2500 tons a month, the furnace coke for shipment up to November, and several local makers are now figuring on this inquiry. The output of coke in the Upper and Lower Connellsville regions last week was 354,569 tons, a decrease of 5584 tons over the previous week. We quote prompt furnace coke at $1.75 to $1.85, and on contracts $1.80 to $1.90 per net ton at oven. Prompt 72-hr. foundry coke of standard grades is held at $2.15 to $2.25, and on contracts from $2.25 to $2.40 per net ton at oven.

The Brier Hill Steel Company, Youngstown, Ohio, which recently took over the organizations of the Empire Iron & Steel Company, Thomas Steel Company, Youngstown Steel Company and Brier Hill Iron & Coal Company, desires to correct the erroneous impression that it is not in the pig iron business. The company has a pig iron department and has ready for immediate shipment large stocks of Bessemer, basic and malleable pig iron, both sand and chill cast.

Emanuel Dreifus & Co., dealers in iron and steel scrap, with main offices in the Arcade Building, Philadelphia, Pa., are discontinuing their Pittsburgh office. Allen R. Hoffer, formerly Pittsburgh manager, will be connected after March 1 with the United States Metal & Mfg. Company, dealer in iron and steel scrap, Morris Building, Philadelphia.

Philadelphia

PHILADELPHIA, PA., February 20, 1912.

More favorable weather conditions have put the trade in a more cheerful frame of mind, but current business still continues to drag. Weakness in prices of finished materials will, no doubt, cause some hesitancy on the part of buyers. Orders have usually been for small lots for early shipment, and in the absence of any large inquiry it is difficult to say how low makers would go to get business. Eastern mills do not show any material gains, and more plants are operating under than above 65 per cent. of normal capacity. Very little business is moving in pig iron and no change in prices is shown. Iron bars are quiet, with prices inclined toward weakness. The old material market is at a standstill. Some movement in both foundry and furnace coke, at slightly higher prices, is noted.

Iron Ore.—Consumers show little interest in the market, evidently awaiting developments in connection with the Lake ore situation before entering into further negotiations. Importations during the week include 22,560 tons of Cuban and 5550 tons of Swedish ore.

Pig Iron.—A fair inquiry for small lots of the higher grades of foundry iron continues, but there is practically an entire absence of any large business. Deliveries on contracts are being freely taken and in instances are urged. Prices for standard brands of eastern Pennsylvania No. 2 X foundry range from $14.85 to $15.25, delivered in this vicinity, although at points in the district where favorable freight rates are available and competition is sharp, slight concessions from the inside price continue to be made by some producers. Virginia foundry irons are moving in small lots at $12.25 to $12.50, Virginia furnace; moderate sales to New England are reported. Several sales of low grade iron have been made to cast-iron pipe makers, both in this district and in Virginia. A sale covering 1000 tons of high sulphur eastern Pennsylvania iron to a Delaware River pipe maker and one of 1500 tons of No. 3 Virginia iron to a pipe foundry in that district are reported. Pipe makers are still in the market for considerable low grade iron, but no definite inquiries are reported. While there has been no active demand for forge iron, a sale of a 500-ton lot to a rolling mill, at the market, is noted. Some little business in special grades of pig iron is noted, including an inquiry for upward of 1000 tons of malleable. The steel making grades have not been particularly active. A sale of 500 tons of standard low phosphorus iron for early shipment at $19.25, delivered, and an aggregate of some 500 tons at $19, delivered, are reported. The inquiry for 2000 tons of basic iron by the receiver of the Central Iron & Steel Company is still unclosed, as is also that for a round block of low phosphorus iron for second half delivery, which has been before the trade for some time. The position of the market from a producer's standpoint is a trifle better, not that orders have materially increased, but rather that deliveries are being regularly taken, in instances representing a larger amount than current production. Prices are practically unchanged, most consumers paying them without any particular hesitancy. For delivery in buyers' yards in this vicinity the following range is named for standard brands:

Eastern Pennsylvania No. 2 X foundry	$14.85 to $15.25
Eastern Pennsylvania No. 2 plain	14.60 to 15.00
Virginia foundry	15.00 to 15.50
Gray forge	14.25
Basic	14.25
Standard low phosphorus	19.00 to 19.25

Ferroalloys.—A little more interest in the ferromanganese situation is noted, due to delays which have developed in deliveries and small purchases of prompt material at $41, Baltimore, have been made to tide consumers over. One inquiry from an Eastern steel works for 500 tons of ferromanganese is reported. Small inquiries for 50 per cent. ferrosilicon have come out, but there has been little demand for the 10 to 12 per cent. furnace grade.

Billets.—Sufficient business continues to come out to enable Eastern mills to maintain their recent productive rate, which is usually on a single turn basis. Orders seldom exceed a few hundred tons and, for the most part, are smaller, usually for prompt shipment. No changes in prices are announced, basic open-hearth rolling billets being quoted at $22.40 to $23 and ordinary forging billets at $26.40 to $27.40, delivered in this vicinity.

Plates.—Considerable irregularity prevails in heavy steel plates. Several of the large orders which were recently accredited to Eastern mills, it has now developed, were really diverted to the West, and mill activities here range from 50 to 65 per cent. A moderate volume of miscellaneous business comes out from day to day, but few new inquiries of any size have appeared and the market, therefore, has not been seriously tested. Some producers firmly refuse to shade 1.30c., delivered here, and have turned down business at a lower basis, but other makers are willing to name 1.27½c. for moderate business and would quote 1.25c., delivered, if the business were attractive.

Structural Material.—Little new business has come out. The Manufacturers' Club has been formally awarded to Irwin & Leighton at their bid of $670,000. Something over 2000 tons of material will be required, which, it is stated, will go to the leading interest. An Eastern mill has the contract for 3000 tons of building work in the New York district. Bids are being figured on for the Vendig Hotel in this city, previously reported. The Lasher Building, it is now stated, will be of concrete construction, but from 600 to 800 tons of structural material will be required. There has been a moderate demand for plain shapes, prices for which show the same irregularity noted in connection with heavy steel plates. For good specifications 1.25c. might be done, but 1.27½c. to 1.30c., delivered, is generally quoted for the ordinary run of business.

Sheets.—Eastern mill order books are in pretty fair shape, some makers having sufficient business on hand to enable full capacity operations for several weeks, while a very good volume of orders, usually small individually, continue to come in. Mills in this district have made no concessions, but Western sheets are easier, 2c. to 2.05c., delivered here, being named. Eastern mills making smooth, loose-rolled sheets obtain ¼c. to ½c. advance over the outside quotation.

Bars.—The market is a trifle unsettled. Several leading makers of iron bars are holding firmly at 1.27½c., delivered, although other makers name 1.25c. on desirable orders. Steel bars are available for prompt shipment at 1.25c., delivered. The general demand is light and mills are gradually working out orders on hand.

Coke.—A better movement in both foundry and furnace grades has developed. Several sales of prompt furnace coke, one of 2000 tons at $1.75 at oven and another of 5000 tons at $1.80 being reported. Heating coke continues in good demand. Foundry coke sales have not been large, but are somewhat more numerous, and $2.20 to $2.40 at oven now represents the market for the better grades. For delivery in this territory the following prices, per net ton, are named:

Connellsville furnace coke	$4.00 to $4.15
Foundry coke	4.40 to 4.60
Mountain furnace coke	3.70 to 3.85
Foundry coke	4.05 to 4.30

Old Material.—Transactions have been on a very limited basis, both buyers and sellers awaiting developments. Forced sales of small lots are occasionally made at minimum quotations, but no large lots are being either offered or asked for. While better than $12.15 was recently paid for No. 1 heavy melting railroad steel, melters are not offering over $11.75 to $12, but would probably pay up to $12.25 for steel crops. Business in the rolling mill grades of old material is quiet. The following range of prices about represents quotations at which ordinary current business for prompt shipment can be done for delivery in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to $1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap and crops	$11.75 to $12.25
Old steel rails, rerolling (nominal)	13.50 to 14.00
Low phosphorus heavy melting steel scrap	15.50 to 16.00
Old steel axles	17.00 to 17.50
Old iron axles (nominal)	22.00 to 23.00
Old iron rails (nominal)	15.50 to 16.00
Old car wheels	12.00 to 12.50
No. 1 railroad wrought	14.00 to 14.50
Wrought iron pipe	11.50 to 12.00
No. 1 forge fire	9.75 to 10.25
No. 2 light iron (nominal)	6.75 to 7.25
Wrought turnings	9.00 to 9.50
Cast borings	8.00 to 8.50
Machinery cast	13.00 to 13.50
Railroad malleable (nominal)	11.75 to 12.25
Grate bars, railroad	10.00 to 10.50
Stove plate	9.50 to 10.00

The Lebanon Steel Foundry, Lebanon, Pa., manufacturer of crucible steel, alloy, vanadium and high carbon crucible castings, has completed its new plant, which was put in operation last week. A very satisfactory volume of business is on the books and indications favor operation to full capacity at an early date.

Cleveland

CLEVELAND, OHIO, February 20, 1912.

Iron Ore.—Another Pennsylvania consumer is feeling the market on Lake Superior ore prices for an unspecified tonnage for its 1912 requirements, making three inquiries that have come from the East in the past few weeks. However, none of these inquiries has so far resulted in sales, and while negotiations have not been dropped it is not probable that any contract for Eastern shipment will be made for some time, if at all. Efforts of sellers during the last two weeks to interest furnacemen in the Central West in the ore market have been unsuccessful. An active buying movement is not likely to start for some time. The severe winter weather will make the opening of the navigation season quite late, and this may also have some effect in delaying the ore buying. Some of the Lake Superior mining companies have decided not to operate their properties the present season if prices are reduced, and other mines that were idle last year because of the limited demand will not be started up unless present prices are maintained. Railroad representatives are investigating the ore situation in connection with freight rates, and the reduction of rates from Lake Erie ports to the Pittsburgh district is considered possible. Shipments from docks have increased considerably since the weather has become milder. We quote prices as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—The market is extremely dull. A few sales ranging from a carload to 100 tons of foundry iron are reported, but practically no new inquiries are coming out and no new tonnage of any size is being figured upon for any grade of iron. Shipments on contracts are holding up well. Consumers have little iron in their yards and are urging prompt delivery. Shipments have been seriously delayed the past two weeks, owing to car shortage due to a congestion of railroad traffic caused by the cold weather. Prices on foundry grades are being well maintained. There is a limited demand for Southern iron in small lots. Corrigan, McKinney & Co. announce that they will keep one of their two Cleveland stacks on foundry iron. If they build a steel plant of sufficient capacity to require the output of more than one stack they state that while the matter has not been definitely decided upon they will build a third blast furnace. Furnace B of the Detroit Iron & Steel Company, which was banked because of frozen ore, will either go out of blast at once or be operated for only two weeks, then wait until after navigation is opened, having only a two weeks' supply of ore on hand. We quote the following prices for prompt shipment and for the first half, delivered, Cleveland:

Bessemer	$14.90
Basic	13.25
Northern foundry No. 2	$13.25 to 13.50
Southern foundry No. 2	14.35 to 14.85
Gray forge	12.50
Jackson County silvery, 8 per cent. silicon	17.05

Coke.—Consumers are having considerable trouble in getting deliveries promptly because of car shortage. The market is quiet. The only sales reported are small lots of foundry grades. We quote standard Connellsville foundry coke at $1.80 to $1.90, at oven. Standard foundry grades are held at $2.10 to $2.25 for prompt shipment and $2.25 to $2.40 for contract.

Finished Iron and Steel.—The limited volume of new business has resulted in the further softening of prices on some lines. The market for steel bars is now practically on the basis of 1.10c., Pittsburgh, although mills are still getting 1.15c. for quite small lots. Plates are selling quite generally at 1.10c., Pittsburgh, only small orders going at $1 a ton higher. Structural material is somewhat firmer than bars and plates. Structural shapes are quoted at 1.15c., Pittsburgh. This price, however, could probably be shaded on a round tonnage. Because of lower quotations on soft steel bars, hard steel bars are being offered at lower prices than have been prevailing, sales being reported at 1.05c., Pittsburgh, and lower. While new business is lacking in volume specifications on contracts are holding up in a very satisfactory manner. Manufacturers are generally fairly busy and are taking the material they have under contract. The only tonnage of any size that has come out during the week is about 5100 tons of plates and shapes for new Lake boats. The Carnegie Steel Company has taken 2600 tons for two package freighters to be built by the Toledo Shipbuilding Company for the Atlantic coast trade. Sheet prices are weaker. Mills are quoting No. 28 black at 1.85c. and No. 28 galvanized at 2.85c. For small lots $1 a ton more is being paid, and the lower quotation for round lots is not being made by all of the mills. There is a fair demand for light rails, but strong competition is coming from makers of rerolled rails. The demand for iron bars is light, but the price is steady at 1.20c., at mill.

Old Material.—The only change in the condition of the market is that with the abatement of severe weather more scrap is being delivered on contracts. Shipments were quite generally held back during the cold spell. New demand, however, has not developed, no inquiries for contracts coming out. Local mills are still well covered, but concessions from current prices might bring out some business. Heavy steel is freely offered at $11.50, but local mills will not buy except at lower prices. The market is weak, with no changes in quotations. Dealers' prices, f.o.b. Cleveland, are as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.25 to $12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.00 to 11.50
Old car wheels	12.00 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Light bundled sheet scrap	9.50 to 10.00

Per Net Ton.

Iron car axles	$18.50 to $19.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	6.75 to 7.00
Steel axle turnings	7.25 to 7.75
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, February 21, 1912.—(*By Telegraph.*)

Pig Iron.—Furnaces in the Birmingham district proper are holding out for $10.50 on No. 2 foundry, and a few small sales for delivery before July have been made at this figure. However, there is some Southern iron to be obtained at $10 for prompt movement, considerable of which is said to be resale material that has to be moved. The present quotation of $13, Ironton, for Northern No. 2 foundry prevents Southern iron producers who are quoting the advanced price mentioned from selling in a number of localities. The inquiry is quite light. The largest before the trade here calls for 1000 tons of low phosphorus iron for a Michigan melter. A northern Ohio manufacturer wants 500 tons of mixed Northern and Southern foundry. Among sales reported are 600 tons of No. 4 Southern foundry at $9.25, Birmingham basis, and 200 tons of No. 2 soft at $11 at furnace, which sales show the wide range of prices prevailing. A number of consumers have been trying to feel out the market for third and fourth quarter shipment, but producers in both Northern and Southern territory have been holding back quotations for this delivery. It is generally believed that no extensive buying movement will be commenced until books are opened for last half business. Malleable is unchanged at $13, Ironton. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	$13.75 to $14.25
Southern coke, No. 2 foundry and 2 soft	13.25 to 13.75
Southern coke, No. 3 foundry	12.75 to 13.25
Southern coke, No. 4 foundry	12.50 to 13.00
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon	16.45 to 16.95
Lake Superior coke, No. 1	14.70 to 14.95
Lake Superior coke, No. 2	14.20 to 14.45
Lake Superior coke, No. 3	13.70 to 13.95
Basic, Northern	14.20 to 14.45
Standard Southern car wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Connellsville furnace brands have eased off slightly and can be bought for either prompt or deferred delivery at $1.75 to $1.90 per net ton at oven. Wise County 48-hr. coke is quotable around the same figures, with Pocahontas grades bringing about 10c. per ton less. No large contracts are in sight, but the domestic trade is absorbing a considerable quantity of 48-hr. coke. Foundry coke is not in demand, although there is no complaint as to shipments on contracts being held up; on the other hand, consumers have experienced some trouble on account of railroad delays. Prices in all three districts average from $2 to $2.35 per net ton at oven.

Finished Material.—With the exception of wire nails and tin plate, there is very little activity. Published

reports from the East as to the softening in prices on steel bars and structural material have tended to cause customers to hold off making any extensive purchases. So far as this market is concerned, steel bars are quotable at 1.15c., Pittsburgh, and structural shapes at 1.15c. to 1.20c., though any desirable tonnage could easily be placed at the first named figure. Warehouse prices remain around 1.60c. on steel bars and 1.70c. on structural material.

Old Material.—Borings and turnings represent the only class of scrap material in demand, and prices are off about 25c. per ton on nearly all grades. Railroad offerings are a trifle heavier, but present quotations are not attractive and there are few purchases being made by dealers and fewer sales to be noted. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$6.75 to $7.25
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up	20.00 to 21.00
Rerolling steel rails	11.00 to 11.50
Melting steel rails	8.75 to 9.25
Heavy melting steel scrap	8.75 to 9.25
Old car wheels	10.75 to 11.25

Per Net Ton.

No. 1 railroad wrought	$9.50 to $10.00
Cast borings	5.25 to 5.75
Steel turnings	5.50 to 6.00
No. 1 cast scrap	9.75 to 10.25
Burnt scrap	6.25 to 6.75
Old iron axles	15.75 to 16.25
Locomotive tires (smooth inside)	11.25 to 11.75
Pipes and flues	6.75 to 7.25
Malleable scrap	7.25 to 7.75

The Cincinnati office of the Buffalo Forge Company and the Buffalo Steam Pump Company, of which A. J. Chinn is resident engineer, has been moved from the Andrews Building to more commodious quarters at 505 Mercantile Library Building.

Birmingham

BIRMINGHAM, ALA., February 19, 1912.

Pig Iron.—The trading in the past week was comparatively light. A sale of 750 tons of No. 2 foundry for shipment in the first half was the largest reported, for which $10.50, Birmingham, was secured. Carloads and lots of 150 to 300 tons each aggregated 2500 to 3000 tons, all for early shipment, and reported at a basis of $10.50 and $10 for Nos. 2 and 3 foundry, respectively. The inquiry received since quotations were advanced is in very fair volume, and indicates that considerable tonnage for requirement in the first half is yet to be provided for. In a number of cases lots of 1000 to 1500 tons each have been submitted for delivery extending through the third quarter, and some tonnage for strictly last half shipment has been inquired for. The producing interests are generally disposed not to give serious consideration to strictly last half deliveries, but the belief prevails that $10.50 for shipments extending into the third quarter can be made applicable. Reports from the trade indicate a very steady consumption, and shipments against contracts are comparatively heavy. Of course, there is still more or less tonnage against which specifications are being withheld, but such conditions usually exist, even when the market is in a much better condition than at present. The available supply of low grades has not increased, with premium prices obtainable for gray forge and mottled. It is now understood that the proposed blowing out of one local stack will take place prior to March 1, and mention is made of still an additional stack that will have to be blown out very shortly for relining. So far as is known, no plans are under consideration for additions to the furnace output to offset the reduction soon to be made, although at least three stacks now idle are ready for operation on short notice. We continue to quote for deliveries in the remainder of the first half, as follows, per gross ton, f.o.b. cars at Birmingham district furnaces:

No. 1 foundry and No. 1 soft	$10.75 to $11.00
No. 2 foundry and No. 2 soft	10.25 to 10.50
No. 3 foundry	9.75 to 10.00
No. 4 foundry	9.50 to 9.75
Gray forge	9.25 to 9.50
Standard basic	10.25 to 10.50
Off basic	9.75 to 10.00

Cast Iron Pipe.—The tonnage placed with local producers since last report consists mainly of small lots of water pipe for maintenance work. Several large inquiries were received, but specific information is not available. A much larger movement against all contracts since weather conditions have improved is reported, and the several local plants continue to operate steadily. It is now understood that the North Birmingham plant of the United States Cast Iron Pipe & Foundry Company will probably be ready for operation by May 1, and that immediately after that plant is put in commission the Bessemer plant of the same company will undergo extensive repair. We continue to quote water pipe as follows, per net ton f.o.b. cars here: 4 to 6-in., $23; 8 to 12-in., $22; over 12-in., average $21, with $1 per ton extra for gas pipe. Special fittings are quotable at $45 to $55 per net ton here, owing to the nature and sizes required. All of these prices are subject to more or less shading for municipal requirements, but are firm for the small orders placed.

Old Material.—Small lots of wrought and steel scrap were placed by the local mills in the past week, and some tonnage of relaying rails was sold. Machinery cast and other grades suitable for foundry use are being moved about as fast as accumulated in any quantity, but the prices received depend very largely on the several local conditions. Some tonnage of wrought and steel grades will probably be offered to dealers within the next 10 days. The accumulation of all grades on yards at this time is comparatively small. We continue to quote asking prices as follows, per gross ton, f.o.b. cars here:

Old iron axles (light)	$12.50 to $13.00
Old steel axles (light)	11.50 to 12.00
Old iron rails	11.50 to 12.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	6.00 to 6.50
No. 2 country wrought	5.50 to 6.00
No. 1 machinery	8.50 to 9.00
No. 1 steel	8.00 to 8.50
Tram car wheels	7.50 to 8.00
Standard car wheels	9.50 to 10.00
Light cast and stove plate	6.00 to 6.50

St. Louis

ST. LOUIS, MO., February 19, 1912.

Although new business is not particularly large at this time, there is such a satisfactory run of requisitions on contracts that the general feeling is of an optimistic character, the belief being that there will be a new buying movement as soon as the spring fairly opens. This applies especially to railroad business.

Pig Iron.—The volume of business in pig iron continues of a satisfactory character, but is chiefly on specifications on contract. In some instances consumers are even taking more than their contracts call for, indicating that conditions are healthy. In a general way collections are good. Sales of the week include 150 tons of No. 3 Southern at $9.50. The quotation on No. 2 Southern is generally at $10.50. No. 4 is practically out of the market, the best figure obtainable being $9.75, with very little available even at that figure. Northern irons are not in new request at all at present.

Coke.—Transactions in coke are being interfered with just now by the difficulty in obtaining cars for transportation from the ovens, it being stated that in some instances deliveries are as much as eight weeks behind. The only important sale of the week was 1000 tons of by-product coke at $5.25, delivered. Foundry grades continue out of line with the prevailing figures elsewhere, and this difference is being accentuated by the car situation.

Finished Iron and Steel.—Steel rails, standard section, are beginning to show considerable life and the sales during the past week included 300 tons for an Oklahoma road and another of 500 tons, while a Western road has an inquiry in for about 2200 tons of 70 lb. There are also other indications of a spring awakening on the part of the Western and Southwestern roads with the result that greater activity is expected before long. The lumber interests have bought more light nails in the past week than in the six months previous and this buying has been widely distributed, indicating a better market than for more than a year. The coal interests are not expected to do any buying until it is determined what will be the outcome of the apparent determination of the miners to strike April 1 unless they are granted a wage increase. The demand for track fastenings is very good because of the spring work which is being begun in the Southwest. In structural material the outlook is good, though there have been only small orders placed the past week and these with immediate shipment required. In bars the specifications have been fair, but the tonnage has not been up to the mark usually anticipated at this season. Plates are quiet at 1.10c. to 1.15c., with no particular activity expected until some anticipated car orders become an actuality.

Old Material.—The mills are buying bargains only, and in consequence the market quotations are nominal, even with the changes that are noted herewith. There have been no new lists except a small one from the Chicago & Eastern Illinois. There is a reasonable tonnage moving, but mostly on deals previously consummated. We quote prices, f.o.b. St. Louis, as follow:

Per Gross Ton.

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard section, subject to inspection	21.50 to 22.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards cut apart	10.50 to 11.00

Per Net Ton.

Iron fish plates	$12.50 to $13.00
Iron car axles	17.50 to 18.00
Steel car axles	15.00 to 15.50
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Railway springs	9.25 to 9.75
Locomotive tires, smooth	11.00 to 11.50
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	5.50 to 6.00
No. 1 busheling	8.50 to 9.00
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 cast scrap	8.50 to 9.00
Stove plate and light cast scrap	8.00 to 8.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	7.50 to 8.00
Pipes and flues	8.00 to 8.50
Railroad sheet and tank scrap	7.50 to 8.00
Railroad grate bars	7.50 to 8.00
Machine shop turnings	6.50 to 7.00

Buffalo

BUFFALO, N. Y., February 20, 1912.

Pig Iron.—The market is quiet but steady. A fairly large amount of new business has been placed, aggregating 18,000 to 20,000 tons of all grades, from New England, New York State and Canadian points for first half delivery. The total is made up principally of small orders, but includes one of 4000 tons of No. 2 plain and one of 3000 tons of foundry grades, also two orders for off grade malleable taken at $13.25 at furnace. There has been quite a little movement in charcoal iron and prices for this commodity are somewhat firmer. Furnaces in this city report that their bookings for first half delivery about cover their productive capacity and they are in consequence inclined to hold firmly to current price schedules. It is understood, however, that a few of the orders above noted were placed at figures slightly below last week's quotations. We quote as follows, f. o. b. Buffalo, for first half delivery:

No. 1 foundry	$13.75 to $14.00
No. 2 foundry	13.50 to 13.75
No. 2 plain	13.50
No. 3 foundry	13.25 to 13.50
Gray forge	13.00 to 13.25
Malleable	13.75 to 14.25
Basic	14.00 to 14.50
Charcoal, according to brand	15.75 to 17.25

Coke.—The railroad situation on coke deliveries is very much improved over last week and the congestion in freight yards is being broken, although coke producers are still unable to obtain adequate equipment of box cars for loading with foundry coke.

Finished Iron and Steel.—Only a limited amount of new business in bar products is reported, although some buying by railroads and car builders for immediate delivery is noted. Specifications on December contracts for first quarter delivery are being received in good volume. Some consumers have overspecified proportionately on their contracts and dealers are apparently inclined to keep up their stocks a little more liberally than for the past three or four weeks. In steel bars the general run of business is being placed at 1.15c., Pittsburgh, although it is reported that in a few instances especially desirable orders have been taken at 1.10c. Some business has been done in bar iron at 1.25c., Pittsburgh, which is the ruling price. Only small transactions have occurred in shapes and prices are a shade weaker. Good inquiry continues for cold-rolled steel, but business resulting has not been large so far, indicating that a good share of the inquiry was simply to sound the market; prices in this commodity are running from 65 to 67 per cent. discount. Continued activity is observable in fabricated structural material locally and the demand from Canada is of good volume. Mosier & Summers, Buffalo, were low bidders on the general contract for the Technical High School, Buffalo, taking about 1150 tons of fabricated and plain structural material. The Buffalo Structural Steel Company was low bidder for the steel, 200 tons, for the Sidway Building addition, Buffalo, and bids have been opened for steel for the auditorium and clinic buildings for Cornell University, Ithaca, but announcement of the contract has not yet been made in either case. Bids are being received for the steel for the Pratt & Letchworth Company's new malleable foundry building, Buffalo, requiring about 600 tons. The steel for the remodeling of the Third National Bank Building, Buffalo, about 100 tons, has been taken by the Lackawanna Bridge Company, and the Riter-Conley Mfg. Company has been awarded the contract for the Eastman Kodak Company's factory addition, Rochester, 1000 tons, and for an additional building at the Pennsylvania General Electric Company's plant at Erie, Pa., about 600 tons.

Old Material.—The market shows very little activity and sales are still held down to a small aggregate by the tied-up condition of yards, owing to bad weather and consequent restricted transit facilities. Dealers are unable to ship out freely material already sold and aside from this are inclined to hold material, expecting a better demand a little later on, particularly for car wheels, heavy melting steel, borings and turnings. No change in prices is reported. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$12.50 to $12.75
Low phosphorus steel	15.75 to 16.00
No. 1 railroad wrought	14.00 to 14.25
No. 1 railroad and machinery cast scrap	13.50 to 14.00
Old steel axles	18.50 to 19.25
Old iron axles	22.00 to 22.50
Old car wheels	13.00 to 13.25
Railroad malleable	12.50 to 12.75
Boiler plate, sheared	13.75 to 14.25
Locomotive grate bars	11.00 to 11.25
Pipe and tank	9.75 to 10.25
Wrought iron and soft steel turnings	7.25 to 7.50
Clean cast borings	6.50 to 6.75

The Hazard, Coates & Bennett Company, dealing in iron and steel scrap, railroad material and supplies, Rochester, N. Y., announces that E. C. Hazard has disposed of his interest in the company and is no longer connected with it. This will cause no change in the methods of carrying on the business.

Boston

BOSTON, MASS., February 20, 1912.

Old Material.—The market for scrap is duller and prices have dropped on some classes of material. Buying is small, and little scrap is offered. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$8.75 to $9.00
Low phosphorus steel	11.45 to 11.95
Old steel axles	14.00 to 14.50
Old iron axles	17.00 to 18.00
Mixed shafting	13.00 to 13.50
No. 1 wrought and soft steel	10.50 to 11.00
Skeleton (bundled)	7.00 to 7.50
Wrought iron pipe	8.50 to 9.00
Cotton ties	7.00 to 7.50
No. 2 light	4.50 to 5.00
Wrought turnings	5.75 to 6.25
Cast borings	5.25 to 5.75
Machinery, cast	12.50 to 13.00
Malleable	8.75 to 9.25
Grate bars	6.00 to 6.50
Stove plate	8.00 to 8.50
Cast iron car wheels	11.75 to 12.00

The German Iron Market

Prices Are Still Advancing

BERLIN, February 9, 1912.

The news at hand is all of a favorable character. Various advances in prices have been reported. Yesterday the Pig Iron Syndicate raised puddling iron 3 marks; steel-making grades 4 marks; spiegeleisen 5 marks; hematite 3 marks; No. 1 foundry 1.50 to 3 marks; and No. 3 1 to 2.50 marks, the last two varying for different points of delivery. English No. 3 foundry rose 1 mark last week. The association controlling malleable castings has just advanced such articles 3 marks, and ordinary castings 2 marks. On the Düsseldorf Exchange February 2 the price of basic steel bars was advanced 2 marks to 112 to 115 marks, but it is reported in the press dispatches that sales at as high as 118 marks have recently been made. The makers of iron bars are also preparing to advance prices 3 marks. In the south German industrial district dealers have advanced bars 2.50 marks, and plates 5 marks. The manufacturers of wood screws have also just raised prices. The upward trend also extends to ores. The Siegerland producers have advanced ores 60 pfennigs

to one mark per ton in 10-ton carloads, according to quality. The advances take effect at once and hold for the rest of the year.

The production of pig iron in January was 1,374,749 metric tons, about 5000 tons less than the record production of December, but more than for any other month than December. The tendency is toward a further increase of output. The Gelsenkirchen Company has just blown in another of its new furnaces at Esch in Luxemburg, and before the end of the month all its furnaces there will be in blast. The heavy imports of ores also indicate that the furnaces will continue their huge production. The January imports amounted to 815,967 tons, which compares with only 264,794 tons for January, 1911.

It is reported that the great Phönix Company is about to follow the example of a number of the other big concerns of the lower Rhine by establishing a branch plant in the minette region in order to get nearer to its ore supplies. It is said to be negotiating for a site near Rümelingen in Luxemburg.

A report on the state of business in the hardware trade indicates that the factories in nearly all lines of production are well supplied with orders. The greatest activity is in the home trade, while the export trade is in part less satisfactory than previously. Many sections of the trade, however, complain of low prices for their product. The cutlery trade at Solingen is doing well, considerable orders being booked in staple lines of goods. Makers of builders' hardware find themselves in a better position as old contracts taken at lower prices are worked off. This section of the trade has been rather quiet in view of the winter season, but dealers have begun to replenish their stocks against the spring trade. Manufacturers of general metal goods are mostly well filled up with orders, and some of them have more work to do than they can handle promptly.

The Belgian market again sends in news of rising prices. Several days ago an advance of one franc a ton on foundry and puddling iron was reported. The Belgian makers of wire nails are trying to organize a selling agency, which will control prices both for home consumption and export. The French market also appears to continue in a strong position, as indicated by the fact that the beam association has just advanced prices 5 francs per ton. The organization of the Austrian iron trade has also just marked up bar and plate prices 1.50 crowns, to take effect at once.

The British Iron Market

The Threatened Coal Strike an Overshadowing Factor

(*By Cable.*)

LONDON, February 21, 1912.

The coal strike, which many in the trade now consider inevitable, overshadows everything, and iron and steel works generally have given their workmen notice for the end of February. About 800,000 coal miners were represented in the notices previously given that work would stop February 29. Railroad traffic is badly congested. The output of Cleveland pig iron is decreasing, a number of furnaces having turned on hematite iron. Semi-finished steel is firm, but there is no fresh buying. In all lines finished steel products are firm. The shipyards are still booking new contracts freely, and the outlook is brilliant but for labor questions. It is reported that the United States Steel Corporation has taken 5000 tons of rails for shipment to South Africa. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 49s 3d.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 49s 6d.

Welsh sheet bars, delivered at works in Swansea Valley, £5 2s 6d to £5 5s.

German sheet bars, f.o.b. Antwerp, 95s.

German 2-in. billets, f.o.b. Antwerp, 92s.

Steel bars, export, f.o.b. Clyde, £6 12s 6d.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £6 2s 6d.

Steel ship plates, Scotch, delivered local yard, £7 7s 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 17s 6d.

Steel rails, export, f.o.b. works port, £5 15s.

Tin plates, cokes, 20 x 14, 112 sheets, 108 lb., f.o.b. Wales, 13s 6d to 13s 7½d.

New York

NEW YORK, February 21, 1912.

Pig Iron.—The principal inquiry in the market is from a New Jersey manufacturer of furnaces, which will buy this week about 1800 tons, equally divided between higher and lower silicon irons, delivery to be in the second quarter. A railroad supply company with works in New York State is also in the market. There has been keen competition for the business in both the above cases, the 1800-ton inquiry in particular calling out a large number of bids. New England foundries apparently need little iron, most of them from present indications being covered well toward the end of the second quarter. Foundry operations in the New York district are on practically the same scale as for the past few months. Complaint is general of the low prices for castings, and buyers in turn expect low prices from furnaces. There is nothing either within or without the pig iron trade pointing to a material change in the present level of values. We quote as follows for Northern iron at tidewater: No. 1 foundry, $15; No. 2 X, $14.75; No. 2 plain, $14.50 to $14.75. We quote Southern iron at $15 for No. 1 foundry and $14.50 to $14.75 for No. 2.

Finished Iron and Steel.—The local market in plates has brightened, inquiries being out for both ship work and tank work in larger volume than has been the case for some time. Considerable quantities of plates have been placed at 1.25c., Pittsburgh basis, although the market is below 1.15c. for large attractive business. It is known that an effort lately to place a large tonnage of plates here at the 1.10c., Pittsburgh basis, met with refusals. As indicating, nevertheless, the competitive condition of the market, it is interesting to add that in an offering of three or four plates, four different bids were received from as many bidders. Dullness marks the structural market, few projects of size opening up, but there is a great deal of work being figured, some of it behind closed doors. Orders in bar iron are reported to be coming in in quite satisfactory volume and the price by a large producer is held at 1.20c. to 1.25c. at mill. Of recent awards in the structural lines, mention may be made of an addition to the Stevens-Duryea automobile works, East Springfield, Mass., requiring 400 tons, to be fabricated by the American Bridge Company. Barber & Ross, Washington, D. C., are to furnish 350 tons for the Franklin Square Theatre, that city, and it is understood that the Phoenix Bridge Company has 1000 tons and the Fort Pitt Bridge Company, 700 tons, for New York Central terminal area work, and Riter-Conley Mfg. Company, 875 tons for the foundry of the Pennsylvania General Electric Company at Erie, Pa. Other work closed includes 300 tons for a factory building at Lowell, Mass., and 150 tons for an elevated station at East Eighty-sixth street, New York. The New York Central is asking for bids covering seven bridges involving perhaps 300 tons and a large department store requiring several thousand tons of steel is about to be built with frontage on both Sixth avenue and Forty-second street. Quotations are: Steel bars, plates and plain structural material, 1.26c. to 1.31c., bar iron, 1.27c. to 1.32c., all New York. Plain material from store, New York, 1.70c. to 1.80c.

Old Material.—The most important transaction of the week was a sale of 1000 tons of heavy melting steel scrap, which is understood to have been made to a New Jersey consumer. Cast scrap is in slightly better demand, while the cheapest grades of old material have been the object of a little more attention and are slightly stronger. Inquiry from steel works and rolling mills is still quite light. Dealers quote, per gross ton, New York and vicinity, as follows:

Old girder and T-rails for melting	$9.25 to	$9.75
Heavy melting steel scrap	9.25 to	9.75
Relaying rails	20.00 to	20.50
Rerolling rails (nominal)	11.50 to	12.00
Standard hammered iron car axles (nominal)	20.00 to	21.00
Old steel car axles	14.25 to	14.75
No. 1 railroad wrought	12.00 to	12.50
Wrought iron track scrap	11.00 to	11.50
No. 1 yard wrought, long	10.00 to	10.50
No. 1 yard wrought, short	9.25 to	9.75
Light iron	4.50 to	5.00
Cast borings	6.00 to	6.25
Wrought turnings	7.00 to	7.50
Wrought pipe	9.50 to	9.75
Old car wheels (nominal)	12.00 to	12.50
No. 1 heavy cast, broken up	11.00 to	11.50
Stove plate	8.75 to	9.00
Locomotive grate bars	9.00 to	9.50
Malleable cast	9.00 to	9.50

Cast Iron Pipe.—The Department of Water Supply, Gas and Electricity, New York City, will open bids February 29 for 1000 tons of water pipe, principally

12-in. Buying by private consumers continues in better volume than usual for the season. Eastern foundries have made excellent bookings from this class of trade in the past week and their order books are rapidly getting into such condition as to warrant some stiffening in prices. Carload lots of 6-in. are quoted at $22 to $23 per net ton, tidewater.

Chicago

CHICAGO, ILL., February 20, 1912.

Specifications on contracts continue to be received promptly, emphasizing the fact that the recent buying movement provided only for immediate needs. Additional purchases of rails and track fastenings are now a necessity. A further buying of cars is also expected in the near future, as indicated by the pending inquiries aggregating several thousand cars.

Pig Iron.—An inquiry for 600 tons for a vehicle manufacturer is reported, but most negotiations covered lots of 100 to 200 tons for prompt shipment Some buyers are attempting to force the situation somewhat and are making offers for second half. They offer tonnage on the basis of $10 for No. 2, Birmingham, with considerable freedom, but Southern furnaces are maintaining their quotations of $10.25 and $10.50 with considerable firmness. The local situation is colorless with little business and less strength in prices. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal	$16.00 to $16.50
Northern coke foundry, No. 1	14.50
Northern coke, foundry, No. 2	14.00
Northern coke foundry, No. 3	13.50 to 14.00
Northern Scotch, No. 1	16.00
Southern coke, No. 1 foundry and No. 1 soft	15.35
Southern coke, No. 2 foundry and No. 2 soft	14.85
Southern coke, No. 3	14.35
Southern coke, No. 4	14.10
Southern gray forge	13.85
Southern mottled	13.85
Malleable Bessemer	14.00
Standard Bessemer	16.75
Basic	14.75
Jackson County and Kentucky silvery, 6 per cent	16.40
Jackson County and Kentucky silvery, 8 per cent	17.40
Jackson County and Kentucky silvery, 10 per cent	18.40

Rails and Track Supplies.—The distribution of a Western railroad's long pending rail requirements, variously estimated from 20,000 to 30,000 tons, is announced. Several thousand tons additional for other roads was also placed. We quote standard railroad spikes at 1.50c., base; track bolts, with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—Figures are about to be asked on about 4500 tons of steel for two buildings, and a five-story addition to one of the downtown stores is in prospect. Contracts for fabricated material placed during the week include 3500 tons of bridge steel for the Great Northern, of which 960 tons was taken by the Morava Construction Company and 1600 tons by the Chicago Bridge & Iron Company. The American Bridge Company will furnish 1312 tons for the rail finishing building of the Minnesota Steel Company plant. Prices for plain material are subject to some shading and quotations as low as 1.10c., Pittsburgh, and 1.25c., Chicago, seem necessary at times to secure desirable business. We quote for Chicago delivery, mill shipments, 1.25c. to 1.33c., and from store, 1.60c.

Plates.—The inquiry for 3500 to 4500 cars for the Wabash system, 1000 cars for the Northern Pacific and 700 for the Rock Island, together with a possibility of Western car shops obtaining a portion of pending Eastern railroad requirements give promise of additional plate and structural orders of no small importance. The larger mills are well supplied with orders resulting from the continual inflow of specifications, and such weakness as appears in prices is due to the eagerness of smaller mills which have been less favored with business. We quote for mill shipment, Chicago delivery, 1.25c. to 1.33c., and from store, 1.60c.

Sheets.—While orders for both black and galvanized sheets continue to bring to the mills a very good tonnage, attempts on the part of makers to assume a firmer attitude seem to be in advance of the market situation. Buyers show a distinct disposition to seek concessions in price notwithstanding the fact that quotations, particularly for galvanized sheets, are exceedingly low. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—Bar iron business is appearing in more satisfactory volume than for many months, and with perhaps one or two exceptions the mills in this territory are operating to fully 75 per cent. of capacity. Quotations are firmly based on a minimum of 1.15c. Business in steel bars continues in fair volume. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.25c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars, rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Wire Products.—In various directions car shortages are being felt, due more to inadequate locomotive facilities than lack of cars. This has been true to a noticeable degree in the movement of wire products. Indications of an early spring are enhancing the general movement of materials. We continue to quote as follows; Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78 to $1.83; galvanized, $2.08; polished staples, $1.83; galvanized, $2.13, all Chicago.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Company was awarded the contract for 1200 tons for Duluth, Minn. Bids are to close this week on 1300 tons for Toledo, and 2750 tons for St. Louis. Smaller lettings of about 200 tons each are scheduled for Sioux City, Iowa, and Owen, Wis. There has been a fair amount of buying of pipe by the railroads, one road taking 500 tons. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $27; 6 to 12-in., $25; 16-in. and up, $24.50, with $1 extra for gas pipe.

Old Material.—The local market has been decidedly quiet. Prices are softer than a week ago, but the volume of business has been so light as to scarcely establish a quotably lower range. Railroad offerings include 1200 tons from the Milwaukee, 1200 tons from the Eastern Illinois, 350 tons from the Nickel Plate and 200 tons from the Alton. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$15.00 to $15.50
Old steel rails, rerolling	12.50 to 13.00
Old steel rails, less than 3 ft.	11.75 to 12.25
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Steel axle turnings	8.50 to 9.00

Per Net Ton.

Iron angles and splice bars	$12.50 to $13.00
Iron arch bars and transoms	13.50 to 14.00
Steel angle bars	10.00 to 10.50
Iron car axles	17.75 to 18.25
Steel car axles	15.50 to 16.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	10.00 to 10.50
Steel springs	10.50 to 11.00
Locomotive tires, smooth	12.75 to 13.25
Machine shop turnings	6.50 to 7.00
Cast and mixed borings	6.25 to 6.50
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.25 to 6.75
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.00 to 9.50
Pipes and flues	8.00 to 8.50

Metal Market

NEW YORK, February 21, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Feb.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
15	14.37½	14.25	42.85	4.00	3.95	6.70	6.55
16	14.37½	14.25	43.00	4.00	3.95	6.70	6.55
17	14.37½	14.25	.....	4.00	3.95	6.70	6.55
19	14.50	14.37½	42.85	4.00	3.95	6.70	6.55
20	14.50	14.37½	42.80	4.00	3.95	6.70	6.55
21	14.50	14.37½	42.87½	4.00	3.95	6.70	6.55

Prices for both Lake and electrolytic copper are higher. Pig tin prices have declined. Tin plates are lower. Lead is in less demand, with low prices still prevailing. Spelter is in good demand and prime Western is scarce for prompt or early delivery. The antimony market is quiet, with Cookson's still quoted at a figure lower than is usual with that brand.

New York.

Copper.—A firmer feeling developed in the copper market in the last two or three days, with a consequent stiffening in price, not because of any improvement in the demand, for the market is and has been very dull for some days. The reason is a stronger feeling on the part of sellers because of the continuance of reduction in stocks. The market throughout the week has been almost entirely nominal, with Lake copper ranging from 14.37½c. to 14.50c. and electrolytic from 14.25c. to 14.37½c. The higher prices might not hold under a test of actual business. In London the quotation for spot to-day is £63 3s. 9d., and for futures, £63 17s. 6d. The exports of copper this month have been 26,868 tons.

Pig Tin.—The week has seen a very dull market in tin and its present condition is almost stagnant. The fact of there being little or no demand is due to consumers absorbing shipments now arriving for which they had previously contracted. The premium which has been asked for tin practically disappeared, the price to-day being about 42.87½c. With the recent arrivals stocks are being replenished. On March 11 a new form of contract to govern trading in tin, and which has been accepted by the New York Metal Exchange, will become operative. The prices of spot tin in London to-day is £194 10s., and for futures, £191 15s. The arrivals of tin this month have been 3750 tons and the amount afloat is 2470 tons.

Tin Plates.—The tin plate market is without feature in New York beyond a reduction in price, 100-lb. coke plates now being quoted around $3.54, New York, following a reduction at the mills. This reduction follows more or less shading of tin plate prices during the last few weeks. Tin plates laid down at Swansea, Wales, are unchanged at 13s. 6d.

Lead.—The demand for lead has slackened, buyers having been well filled up at the low prices which have prevailed since the American Smelting & Refining Company made three successive reductions a short time ago, and as a result of which it is supposed to have booked a vast amount of business. Prices quoted to-day are 3.95c., St. Louis, and 4c., New York. Independents are asking 4.10c., New York.

Spelter.—The scarcity of various brands of prime Western spelter for prompt and March shipment is unabated and for April shipment as high as 6.65c. to 6.70c., New York, is asked. The demand for the metal is good. Monday last spelter brought 6.60c. in St. Louis at actual sale, which is equivalent to 6.75c., New York. Prices quoted to-day are from 6.65c. to 6.70c., New York, with some brands unobtainable until April at least at the higher figure.

Antimony.—There has been no notable change in antimony beyond a decline of ⅛c. in Hallett's, which is quoted at 7.37½c. Cookson's is 7¼c., and has had most of the business. Chinese and Hungarian grades are quoted at 6.90c. to 7c.

Old Metals.—The market is firm but dull. Selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	13.25 to 13.50
Copper, heavy and wire	13.00 to 13.25
Copper, light and bottoms	11.75 to 12.00
Brass, heavy	8.75 to 9.00
Brass, light	7.00 to 7.25
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.25 to 8.50
Composition turnings	9.50 to 10.00
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	5.25

Chicago

FEBRUARY 19.—Desirable orders for copper have been placed. The price of spelter continues to be well supported. Old metals are freely offered but their sale is limited and prices are without any general change.

St. Louis

FEBRUARY 19.—Lead has begun to recover from the recent sharp drop and is firm at 3.95c. to 4c. Spelter is strong at 6.40c. to 6.50c., according to delivery. The price of tin is 43.35c; Lake copper, 14.80c.; electrolytic copper, 14.70c., and Cookson's antimony, 7.47½c. The takings during the week have been fair. In the Joplin district the basis price for 60 per cent. ore ranged from $47 to $43 per ton for zinc blende, with the top price $50 for choice lots. Calamine brought $23 to $27 for 40 per cent., choice lots bringing as high as $30. Lead ore was in light demand, with prices continuing low at $46 to $48. The railroads are not supplying all the cars needed, and the sudden increase in production and in buying of recent days has found the district short on transportation facilities. In scrap metals there has been an advance and quotations are as follows: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c.; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, February 21, 1912.

The stock market has been dull, and fluctuations have been narrow. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com...	⅞- 1	Pittsburgh St., pref.	101 -101½
Allis-Chalm., pref...	6½- 6¾	Pressed Steel, com.	31
Baldwin Loco., pref.	102¾-103	Pressed Steel, pref.	101
Beth. Steel, com....	29 - 31⅜	Railway Spring, pref.	102½
Beth. Steel, pref...	56⅞- 59⅛	Republic, com.	19⅛- 20½
Can, com.	11⅝- 12⅛	Republic, pref.	72⅜- 75
Can, pref.	91⅝- 92¼	Sloss, com.	40 - 40½
Car & Fdry, com.	51	Pipe, com.	13 - 15
Car & Fdry, pref.	115	Pipe, pref.	50 - 51
Steel Foundries.	28 - 28½	U. S. Steel, com.	59⅛- 61
Colorado Fuel	24⅛- 25¾	U. S. Steel, pref.	107⅞-108½
General Electric.	157 - 160¼	Westinghouse Elec.	70½ 73⅞
Gr. N. Ore Cert.	37¼- 39	Va. I. C. & Coke.	59⅛- 60
Int. Harv., com.	105½-106⅛	Am. Ship, com.	49
Int. Harv., pref.	119½	Chic. Pneu. Tool.	46¼- 46¾
Int. Pump, pref.	79¾- 80	Cambria Steel	42¾- 43
Lackawanna Steel.	30	Lake Sup. Corp.	27 - 28
Locomotive, com.	32⅛- 33¾	Pa. Steel, pref.	101½
Locomotive, pref.	104 -104¼	Warwick	11
Nat. En. & St., com.	13½- 13¾	Crucible Steel, com.	11⅛- 11¼
Nat. En. & St., pref.	92½- 93½	Crucible Steel, pref.	80¾- 81½

Dividends Declared

The General Electric Company, regular quarterly, 2 per cent., payable April 15.

The Harbison-Walker Refractories Company, quarterly, ½ of 1 per cent. on the common stock, payable March 1.

American Foundrymen's Association May Meet in September

A situation has arisen in connection with the annual convention of the American Foundrymen's Association which points to the postponement until September of the 1912 convention which it had been planned to hold in Buffalo in June. A bulletin issued in the past week by the Foundry & Machine Exhibition Company details the conditions which have interfered with the original plans. The Buffalo committee had offered the Foundry & Machine Exhibition Company the 74th Regiment Armory as an exhibition place instead of the Broadway Exposition building as originally proposed. On February 12 the Executive Committee of the Exhibition Company met in Buffalo for the purpose of completing arrangements for the exhibit in June, providing satisfactory progress had been made on the rebuilding of the armory. It was found that the extreme cold weather had delayed the work fully a month and the committee decided that it would be unwise to count on getting possession of the building any time in the month of June. The Buffalo committee then suggested that the Exhibition Company consider some week in September. This proposal was thereupon presented to the American Foundrymen's Association and the American Brass Founders' Association. Dr. Richard Moldenke, secretary of the American Foundrymen's Association, was in Buffalo on Monday of this week conferring with the local committee and he is now submitting the September proposal to the Executive Committee of his association. Similar consideration will be given the matter by the American Brass Founders' Association.

The Foundry & Machine Exhibition Company was asked by the American Foundrymen's Association to consider holding its exhibition in some other city in June, in case arrangements could be made by the Foundrymen's Association to hold their convention elsewhere, deferring the Buffalo convention until 1913. It was found, however, to be impracticable to start anew at this late day to prepare for an exhibition in June and the probability now is that the three organizations will unite on late September dates at Buffalo.

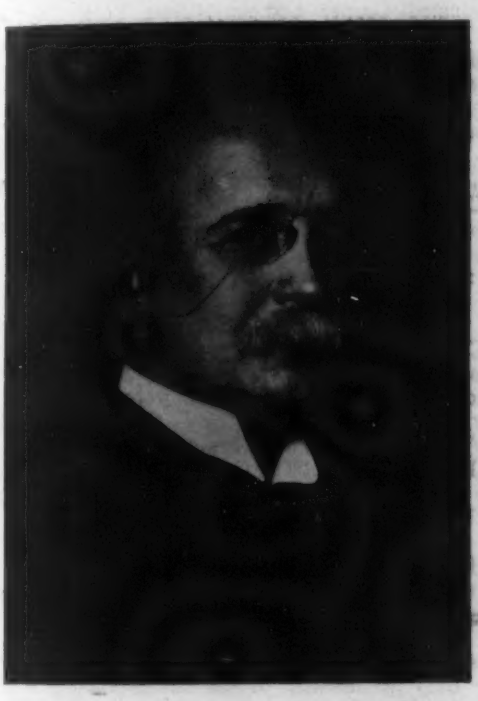
The Temple Malleable Iron Company, Temple, Pa., has materially increased its capacity and output in the past six months. It is now building additional annealing ovens, and contemplates installing more molding machines of the squeezer type.

Obituary

Francis H. Stillman

Francis H. Stillman, president of the Watson-Stillman Company and a prominent figure in machine tool and engineering industries, died suddenly February 18 of intestinal hemorrhage at his home in Brooklyn, N. Y., aged 62 years. The day before his death he had been at his office as usual and apparently in the best of health.

Mr. Stillman was born in New York City February 20, 1850, and was graduated from Yale College in 1874. On leaving college he first associated himself with the Cottrell Printing Press Company, then with his stepfather, Mr. Lyons. In 1883 he organized the firm of Watson & Stillman, which succeeded Lyons & Co. The firm was incorporated in 1904 as the Watson-Stillman Company, Mr. Stillman becoming its president. Under his direction the establishment early became prominent in the hydraulic



FRANCIS H. STILLMAN

engineering field, has built upward of 4000 different types and sizes of hydraulic machines and has now a large plant in Aldene, N. J.

He organized and was the first president of the Machinery Club of New York, and was also the first president of the National Metal Trades Association. In addition to being president of the Watson-Stillman Company at the time of his death he was also president of the Bridgeport Motor Company and of the Pequannock Commercial Company, and a director in other manufacturing firms. He was a member of the Hanover Club of Brooklyn, the Engineers' Club, the American Society of Mechanical Engineers, and since 1903 treasurer and a director of the National Association of Manufacturers. He leaves a widow and two sons, Austin Frank and Edwin Arthur. His affable disposition, high standard of business integrity and kind personal interest in all those with whom he came into contact won for him a large circle of friends.

THOMAS M. GALLAGHER, until recently vice-president of the Scullin-Gallagher Iron & Steel Company, died February 1, at his home in the suburbs of St. Louis after a long illness which necessitated some time ago his retirement from the company, of which he was one of the founders. He was born in New Orleans December 20, 1840. While he was a child his parents moved to Cincinnati, Ohio, where he received his education in the public schools and in St. Vincent College. He went to St. Louis in 1855 with his parents. His father was a blacksmith and he helped in the shop. After some experience in railroad shops he became connected with the firm of Thomas Howard & Co., and the Chickle, Harrison & Howard Iron Company, of which he rose to be vice-president and general manager. In 1900 he assisted in forming the Scullin-Gallagher Steel Company. He was also a director of the East St. Louis Locomotive & Machine Shops. He leaves a widow and two sons.

WILLIAM STEWART HENRY, secretary and treasurer of the St. Louis Engineers' Club, St. Louis, Mo., and one of the best known engineers of that part of the West, died recently.

WILLIAM N. EPPING, vice-president and general manager Epping-Carpenter Company, Pittsburgh, died February 15, the result of a nervous breakdown, aged 43 years. He was the oldest son of Henry Epping, deceased, one of the founders of the Epping-Carpenter Company, and was born in Lawrenceville, Pa. After graduating from the Pittsburgh High School he was employed for several years in a clerical capacity by the Carbon Steel Company, severing that connection to become cashier of the Pittsburgh postoffice during the administration of President Cleveland. Upon the death of his father, Mr. Epping was elected to the position in the Epping-Carpenter Company which he held until the time of his death. He was a member of the Duquesne Club, Stanton Heights Golf Club, Pittsburgh Country Club and Pittsburgh Athletic Association. He leaves a widow, one son and two daughters.

HENRY O. PUTNAM, Fitchburg, Mass., treasurer of the Putnam Machine Company, died February 17, aged 71 years. He was the son of Salmon W. Putnam, who with John Putnam founded the company in 1836. The son learned his trade in the Putnam shops, becoming foreman, and when the company was reorganized 30 years ago he became treasurer. He was prominent in the affairs of his city, holding various public offices. He leaves two sons and a daughter.

WILLIAM WILKES YOUNG, purchasing agent of the Union Switch & Signal Company, Swissvale, Pa., died January 21.

FRANK J. WETHERELL, of the firm of Wetherell Bros., Boston, died February 1 after a brief illness, aged 59 years. He was born in Newton Upper Falls, Mass. He had been identified with the steel business for many years, his firm representing various English steel manufacturers, notably those of Sheffield. He leaves a widow, two sons and a daughter.

CHRISTIAN FROELICH, San Francisco, Cal., agent for manufacturers of cast iron pipe and waterworks supplies, died January 29.

CHARLES P. MILLER, superintendent of the Weir Frog Company, Norwood, Cincinnati, Ohio, died suddenly, of heart disease, February 9, aged 50 years. He leaves a widow.

CHARLES HART, president and treasurer of the Hart Mfg. Company, maker of pipe threading and cutting machines and die stocks, Cleveland, Ohio, died February 9 of heart failure, aged 62 years. He had been in poor health for some time. Over 30 years ago he established the company of which he was the head. For some time its active management has been in the hands of his son, L. F. Hart, vice-president and treasurer.

J. HOWARD MITCHELL, of the firm of Philip S. Justice & Co., Philadelphia, died at his home in Hatboro, Pa., February 6, aged 79 years. He had been actively engaged in business up to a few weeks before his death. With Philip S. Justice he formed the partnership mentioned in 1859. The firm was a large importer in those days, being instrumental in the first importation of steel rails. He was also one of the founders of the William Butcher Steel Works in 1866, serving in an official capacity until 1871, when it was reorganized as the Midvale Steel Company. He leaves two sons and two daughters.

SAMUEL M. DODD, president of the Wagner Electric Company of St. Louis and New York, died in St. Louis the past week, aged 79 years. He was born in Orange, N. J.

Special assortments of cotter pins, designed especially to meet the requirements of users of automobiles, have been placed on the market by F. T. Smith & Co., Sharon Hill, Pa. These pins are packed in lacquered boxes with screw top or hinged lid, an arrangement which makes them easy to carry and readily accessible.

The Newark Foundrymen's Association

Addressing the Newark Foundrymen's Association at its meeting in Newark, N. J., on the evening of February 7, J. P. Bird, general manager of the National Association of Manufacturers, gave his hearers practical points for the avoidance of accidents in the foundry. At the conclusion of his talk he severely arraigned the new employers' liability law of New Jersey and declared: "The National Association of Manufacturers has stood for one thing, first, last and all the time, and that is: Put in prevention devices, eliminate the accident just as far as human ingenuity can, and then all join hands—employer, householder, farmer, groceryman or butcher—and make a joint fund to be administered by the State."

On the subject of safety devices in the foundry, Mr. Bird asked: "How many times, when a large flask has been lifted by a crane, have you seen a man crawl under it without there being any safeguard in case of its falling, beyond a simple piece of wood? Any foreman who permits a man to crawl under a flask at such a time without there being under it at least two horses—and there should be four—should be discharged.'"

The speaker went on to point out the danger of the collapse of the old-fashioned horse when a heavy weight drops upon it because of the tendency of the legs to spread. He advised his hearers, a considerable number of whom were foundry foremen from the plant of Maher & Flockhart, Newark, and the guests of Mr. Flockhart, to use a horse with a perpendicular leg between each pair of slanting ones. "Then," said he, "the worst that can happen when a great weight drops on the horse is the driving of the legs into the sand, and a man working under the flask has a chance to get out before he is crushed."

Mr. Bird also said: "Watch your molders' feet. If a man starts work with an old, loose pair of shoes, tied on with strings, have him get a pair of congress shoes. If he won't buy them, buy them for him or don't keep him. The congress shoe will save more accidents than you imagine. If a man gets caught, you don't have to unloosen or unbutton that kind of a shoe—the man can be pulled out of the shoe if his foot is fast. Be careful of the trousers. If a man wears a dilapidated pair of trousers, buy him some jean trousers. Sparks and iron do no harm when they strike jean, but they ignite woolens and may cause a man to be burned."

The speaker urged the use of compressed air instead of blow-pipes, holding the blow-pipe responsible for injuries due to the sand flying into the eyes of the worker. He said that explosions from gases in core ovens could be avoided by means of a damper or flue in the back of the oven, giving the gas a means of exit just after the lighting. He advocated the placing of a sheet iron shield partly around the base of a cupola before dumping, thereby protecting the man who has his back to the cupola, or who cannot get away quick enough.

Referring to the employers' liability law which became operative in New Jersey about six months ago, Mr. Bird said of the efforts to have it enacted: "The Legislature and the Governor were gunning for elephants. Every possible argument was presented to Governor Wilson as to the ramifications of the proposed legislation, but it could not be impressed upon his mind that nearly 90 per cent. of the manufacturers of New Jersey employ less than 50 men and these employers had to stand this taxation—because it is taxation, not for the benefit of the State, but of private enterprise. He was advised that if this law passed it was a lever for the insurance companies, that they would double their rates and in many cases treble them. We know of cases where they are 700 to 900 per cent more than they were before the enactment of the law." He told of the troubles that confront the employer of even one servant under the new law.

The Cleveland & Buffalo Transit Company has placed a contract with the Detroit Shipbuilding Company for a side-wheel passenger steamer which it is claimed will be the largest in the world. It will be 500 ft. long, 55½ ft. beam, 98 ft. over guards and 24 ft. deep, and will be equipped with compound engines and Scotch boilers. The plates and shapes for this boat, 2000 tons or more, will be rolled by the Carnegie Steel Company.

Annual Meeting of Mining Engineers

The American Institute of Mining Engineers held its 102d meeting in the Engineering Societies Building, New York City, February 19, 20 and 21, the first in New York since February, 1908. Considerable interest lay in a number of proposed amendments to the constitution, involving a change in the status of membership grades, the dues for membership and the scope of the Institute, but the questions were not voted, the idea being that further time was needed for a better understanding of the issues. It is expected that a definite vote will be taken in a conference of the Council on June 3.

The officers elected at the annual business meeting held on Tuesday were:

President of the Council, James F. Kemp, professor of Geology, Columbia University, New York City.

Vice-presidents of the Council, terms expiring February, 1914: Benjamin B. Thayer, assistant to president, Amalgamated Copper Company, New York City; Karl Eilers, New York City; Waldemar Lindgren, United States Geological Survey, Washington, D. C.

Secretary of the Council, Dr. Joseph Struthers, 29 West Thirty-ninth street, New York City.

Members of Council, terms expiring February, 1915: Joseph W. Richards, professor of Metallurgy, Lehigh University, South Bethlehem, Pa.; John H. Janeway, Jr., New York City; Sidney J. Jennings, Dobbs Ferry, N. Y.

Three directors of the nine who manage the business affairs of the Institute as distinguished from the professional affairs were elected as follows, for a three years' term: Edmund B. Kirby, St. Louis, Mo.; George C. Stone, chief engineer New Jersey Zinc Company, New York City, and Charles F. Rand, president Spanish-American Iron Company, New York City.

Among the papers scheduled were the following: "Sintering of Fine Iron Ore," by B. G. Klugh, Birdsboro, Pa.; "Agglomeration of Fine Materials," by W. S. Landis, South Bethlehem, Pa.; "The Grondal Briquetting Process," by N. V. Hansell, New York City; "Vanadium in Pig Iron," by Porter W. Shimer, Easton, Pa.; "Rational Valuation and Quality Efficiency of Furnace Stock," by Prof. John Jermain Porter, University of Cincinnati; "Fuel Economy of Dry Blast," by R. S. Moore, New York City; "Sintering and Briquetting of Flue Dust," by Felix A. Vogel, New York City; "The Schumacher Briquetting Process," by Prof. Joseph W. Richards, Lehigh University.

The total membership of the Institute on January 1, 1912, was 4174.

The Question of Aiding Canada's Steel Industry

TORONTO, February 17, 1912.—No action has been taken on the petition of manufacturers for a renewal of bounties. As the time passes the strength of the opposition to the proposal seems to become more telling. Petitions against a return to the bounty system are now being received from agricultural constituencies. Should the Government, contrary to present expectations, grant the wish of the iron and steel manufacturers in the premises, the arrangement would probably be of an interim character. It would hold only until the Government acts on information placed at its disposal by the Tariff Commission. The Tariff Commission is not yet in existence, the bill providing for its constitution being now in its course through the House of Commons. That it will become law this session is a practical certainty, though there are rumors of an intention on the part of the Liberal majority in the Senate to prevent its enactment in the present form. It is very strongly opposed by the Liberal minority in the House of Commons. Once the measure is on the statute book and the members of the commission appointed, the inquiry will begin. The task will be a long one, as the scope and powers of the commission are very extensive.

If the commission carries its investigations along all the ramifications of the economic matters referred to it and referable to it, its labors will engage it for some years. Doubtless somewhat early in its operations a stage will be reached at which it will be able to place in the hands of the Government the material facts for the consideration of the state of the tariff on this or that group of commodities.

It is possible, for example, that the Government might soon be placed in a position to consider the duties on agricultural implements and kindred articles of importance to the farmers. There is a strong demand in the West for the removal or great reduction of the duties on agricultural implements and for an increase of the British preference. This demand might accelerate inquiry into the equitableness of the present implement duties.

When the commission has collected the data requisite for the revision of the iron and steel schedule, and that revision is carried out, it is not likely that bounties will be further resorted to. If it is then found advisable to continue to foster the iron and steel industry, customs duties that are deemed sufficient will, it is believed, be the exclusive protection provided. It is the declared policy of the present Government to promote the development of Canada's natural resources for the employment of Canadian labor.

If the United States duties on iron and steel are reduced in any such degree as the House of Representatives at Washington now favors, it is regarded as a foregone conclusion that a new and strong impulse will be given to the movement of American branch steel and iron works to Canada, especially if protection is adhered to in this country. That is an eventuality to be considered in the revision of the Canadian duties on iron and steel. The divesting of United States iron and steel industries of their protection and the confirming or supplementing of the protection on the Canadian iron and steel industries could hardly fail to stimulate production by intensifying competition in Canada.

The more or less positive predictions recently made about the renewal of the Canadian bounties have been attended by talk of large expansion of ironmaking capacity at Port Arthur and of schemes to establish steel works there. Provisional announcements have been made of undertakings of like character in other parts of the country.

C. A. C. J.

The Iron and Steel Tariff

Chairman Topping Appears in Opposition to the Underwood Bill

John A. Topping, chairman of the Republic Iron & Steel Company, appeared before the Senate Finance Committee at Washington February 17 to speak concerning the changes in the iron and steel tariff proposed by the Underwood bill. He said that the capital employed in iron and steel manufacture in this country is estimated at $2,250,000,000, and that the estimated wage disbursement is $400,000,000 a year, the number of employees being about 500,000. It was his opinion that in the event of the passage of the Underwood bill the loss to iron and steel works labor, due to reductions of wages to meet foreign competition, would amount to not less than $100,000,000 a year. The scale of wages now paid in steel works is the highest ever paid to his knowledge. Common labor receives $1.75 a day and some of the more highly skilled workmen as high as $10 to $15 a day. The average wage paid in the works of the Republic Iron & Steel Company in the past year was given as $2.48 per day, or $776 a year, this reckoning not including salaries of officers or of any salaried employees.

Difference in Labor Cost Not Covered

Referring to the 8 per cent. ad valorem duty on pig iron proposed by the Underwood bill, Mr. Topping said that it was by no means adequate to cover the difference in labor cost between the United States and Germany or Great Britain. In the South the labor cost represented in a ton of pig iron, taking in all the raw materials entering into it, he estimated at $5. In Germany or England it is about half that amount. As against this difference of $2.50 the Underwood bill offers protection which on the basis of the present market abroad would amount to about $1 a ton. While foreign pig iron has reached American ports at from $1.75 to $2.50 freight Southern iron cannot be laid down on the North Atlantic seaboard at less than $4 a ton. It does not have the benefit of low water rates as is the case with foreign pig iron, since the steamers engaged in coastwise trade are largely controlled by railroads and rates are maintained.

Replying to questions concerning recent comments on unfavorable works and living conditions in the iron and steel industries, Mr. Topping said these were gross exaggerations. While it is true that the 12-hr. system obtains in many departments, the hours of labor in mills were established years ago when labor unions controlled conditions in the industry. He recalled the opposition of the unions to the establishment of 8-hr. turns in mills, since this would necessitate the training of many more men for such work, and the unions were opposed to increasing the supply of skilled labor. He considered that the 12-hr. day had rather been instituted by the unions than by the trusts. In the case of most of the men working on 12-hr. turns there is an alternation of periods of work and of rest, the actual working time probably averaging around 6 hr. a day.

The Steel Corporation and Wage Maintenance

Mr. Topping considered that credit was due to the United States Steel Corporation for maintaining the present high standard of wages and for doing more along sociological lines and in various forms of benefits for its employees than any of its competitors. Present wage rates and existing welfare work recently started by all steel manufacturers could not be continued if the Underwood bill became a law. He pointed out that while wages to-day are the highest ever known, prices of iron and steel are lower than they have been in 15 years. He believed that no revision of tariff schedules should be made except after scientific investigation by experts.

His attention being called to the increasing exports of the United States in iron and steel, Mr. Topping said that these were not due to lower costs of production in this country, but to low selling prices caused by excessive competition at home, there being at the same time an abnormal demand and consequent high prices in foreign countries. He considered that exports of iron and steel by the ordinary manufacturer in this country are highly improbable. A few of the larger independent companies could do some exporting, but the principal tonnage would necessarily be confined to the United States Steel Corporation on account of its transportation advantages which lowered the cost of its product.

A Statement for the Lackawanna Steel Company

Ex-Congressman James T. McCleary, New York, appeared on behalf of the Lackawanna Steel Company, presenting a letter prepared by President E. A. S. Clarke of that company; also a copy of a letter written by Mr. Clarke to Sereno E. Payne, chairman of the Ways and Means Committee which prepared the tariff bill of 1909, and in addition a copy of a letter written by Mr. Clarke to Chairman Underwood previous to the passage of the bill now pending. Mr. McCleary said that the Lackawanna Steel Company employs about 12,000 men and that the annual pay roll is about $10,500,000. Since the passage of the Payne bill which reduced the duties on iron and steel, he continued, a part of the American territory had been taken away from domestic producers by foreign manufacturers, and further reductions in duties would be disastrous. In 1911 the profits of the Lackawanna Steel Company had been less than ¼ of 1 per cent. on the capitalization and this capitalization is not watered.

Mr. McCleary commended the statement of Mr. Topping, who had preceded him, as an excellent epitome of the facts in the case. He had had occasion to examine into the prices of steel rails in the United States and in Europe and had found that in no country do the mills make sales to their domestic railroads at as low prices as are charged in this country by the rail manufacturers. He attributed this to the large American output, on which our manufacturers require a less margin of profit. Mr. McCleary had found that for the past 10 years American rail prices averaged lower than those in Great Britain, year by year. He had found also that the difference between domestic and export prices charged by European rail manufacturers was greater than the difference between export and domestic prices for rails in this country.

Frank Samuel, Philadelphia, protested against the increase in duty on ferromanganese provided by the Underwood bill, as increasing the cost of making steel, whereas the bill reduced the duty on every form of finished steel. Statements were made regarding other metal products.

Machine Tool Builders' Tariff Hearing

Testimony of Machine Tool Builders Before the Senate Finance Committee at Washington, D. C., February 14 and 15, 1912

In *The Iron Age* of last week a report was presented of the hearing of machine tool builders February 13 before the Finance Committee of the United States Senate in relation to the Underwood tariff bill, which proposes to put machine tools on the free list. It had been supposed that only one day would be given to the representatives of this branch of industry, but the subject was regarded with such importance by the members of the committee that they extended the hearing over two more days. Fred A. Geier, of the Cincinnati Milling Machine Company, was thus permitted to continue his argument, and acquitted himself even more creditably than on the first day. A nearly verbatim report is presented below of the proceedings on February 14 and 15.

Continuation of Fred A. Geier's Testimony

MR. GEIER. In the hearing yesterday we got to a point where we showed that the prime cost of labor, both for skilled and unskilled labor, was in Europe one-half what it is in this country. A low cost of labor in Europe does not necessarily mean that that gives a low cost of production, and the question of the efficiency of that labor is directly involved.

Captain Carden's Report.

I want to read to you from the report of the Government expert, Captain Carden, as follows: "It is not too much to say that Americans in general have not been giving the Germans credit for learning and developing in machine-tool construction, and if it is proposed to keep ahead in shop efficiency the United States must look to the training of workmen from boyhood up."

Again, at page 43 of the report: "The shop managers at Borsig's [a very large concern in Berlin] have learned wonderfully well how to get the maximum capacity out of tools. There could undoubtedly be reductions made in the force employed, but there can be no mistake about the tools working at practically 100 per cent efficiency. It would be refreshing for some of our American manufacturers, who believe that we alone understand the term 'shop efficiency,' to take a walk through these shops, and I believe that a glimpse of the workings of this particular plant would cause a realization of what there is ahead of America in foreign competition."

Speaking of a shop in Belgium, Captain Carden says: "Jules Mèlotte was a member of the jury of awards at the St. Louis Exposition, and is the sole proprietor of the Mèlotte works. He has a wide knowledge of American manufacturing methods, and being an engineer, he has applied American ways in the Remicourt shops. The most exacting of American shop superintendents would find it difficult to improve on the Mèlotte installation, and as to the administration the system in vogue would seem to leave little to be desired. I could perhaps mention shops which are working faster than Mèlotte's, but the list would comprise our very best works."

I have given you the low cost of labor and I have given you evidence of the high efficiency of those plants. The elements of the costs are material, labor, and overhead. Next is the question of volume. It has been repeatedly stated here that the volume affects the cost of a manufactured article. That is certainly one of the fundamental principles of manufacture. If I have a plant to produce 1000 machines, and work it at 100 per cent of its capacity, I can get a normal cost of manufacture. If I reduce the volume of that output to 500 machines, my costs multiply very rapidly, and I get from an earning basis to a loss basis.

German Progress

We have shown you, and will show you further on in the argument, that Germany is increasing her volume. The volume of her manufacture of these lines of articles has been multiplied very many times during the last decade. I will also show you that in their shop systems they have organized their plants upon American lines. Their expert engineers have been visiting here in great numbers, and they have copied our methods as closely as any enterprising nation could possibly copy another. They give our people credit for being the originators of these machines, for being the originators of the methods of manufacture, and they say: "We have taken from the Americans their ideas of design and their ideas of manufacturing." I have a catalogue of the Lavier concern, published away back in 1900 and am sorry I have not got it here. I wanted to show you a typical German plant. It is a marvel in its completeness and in the manner in which it is laid out; and there is nothing in this country any better than that plant.

You should keep before you the fact that they have our designs; they have our methods of manufacture; they have everything that we have; and they have got what we have not got, namely, labor at a cost one-half of what we have to pay ours.

It was stated yesterday that in our plants we should specialize more, and we should economize more, and bring out new types of machines. We are doing that. We have done it all the time and propose to do it in the future; but that only leads us up to a certain point. If they imitate us along those lines we cannot get over the great difference between the two countries in the cost of labor.

SENATOR HEYBURN. I think it would be well to have some definition or illustration of that word "tools." To you it is familiar, but to some who will have to consider this question it might be well to know what you include within the term "tools."

Defining the Term "Machine Tools"

MR. GEIER. A machine tool, to the machine tool manufacturer, until I came here and got some of the Treasury decisions, meant a machine made of iron and steel, using a tool operating for metal cutting. A shaper is a simple machine. It operates a single pointed tool backward and forward over a piece of metal to smooth its surface. A planer is a similar tool, only on a larger scale, to take a larger piece, in which again the work is passed over by means of a single pointed tool. That is for flat surfaces. I make a distinction between a machine and a tool. The tool is a piece of tool steel held in a machine tool, and which operates on the work to be done.

SENATOR MCCUMBER. The term "tool," as used by you, signifies not only the particular tool that does the cutting, but all the machinery necessary for the manipulation of that tool in the many kinds of steel work?

MR. GEIER. A machine tool, may I say again, is used in every line of manufacture where metal is employed in the product. For instance, no Government arsenal or shipyard could build its product without all the different types of machine tools—shapers, planers, lathes, drilling machines to drill holes, boring machines to drill larger holes; and planers to smooth off the large parts of a casting that enter into an engine or motor, or some other machine.

SENATOR MCCUMBER. Here is a cut of a heavy double axle lathe. That cut, the whole thing, would be included under your term "tool"?

MR. GEIER. That is a machine tool, that big machine; and this, of course, carries a smaller tool, of tool steel, that operates on the piece.

SENATOR JOHNSON. Is the Government's interpretation wider than yours that you have now given us, or narrower?

MR. GEIER. The interpretation on the part of the custom house officials has very much broadened the machine tool beyond what the trade understands it to be. For instance, the Government in its own statistics has always classified wood-working machinery as separate and distinct from machine tools, because it works on wood.

SENATOR JOHNSON. And you only include in your definition, you said, a tool used for metal working?

MR. GEIER. My understanding up to the present time is that a machine tool works on metal, but the Government recently has broadened its interpretation because of the fact of pressure being brought upon it, since there are two rates of tariff—30 per cent for machine tools, distinctly classified as machine tools, and 45 per cent for other machinery. Naturally, the importers are trying to put into the machine tool classification machines that heretofore, by the trade, were not considered machine

tools. In one decision recently, for instance, in connection with a machine imported by the Georgia Pulp & Paper Mfg. Company, a machine they call a rossing machine, to take the bark off the logs in the manufacture of pulp, was by the custom house officials first classified as a wood working machine, taking, therefore, the 45 per cent rate; but in the process of the argument the court finally held that that machine was entitled to the 30 per cent rate. In other words, it classified it as a machine tool. So I do not know where the end lies.

SENATOR SMOOT. I notice in Treasury Decisions, volume 21, No. 23, the decision was in that case: "A machine, in machine tools, connotes the application of some kind of power in the operation of an implement other than hand power alone." If that is to be conclusive, then the decision it seems to me would be that every machine that was run by power, whether wood-working machinery or metal-working machinery, would be classed as a machine tool.

MR. GEIER. You are absolutely right. My own thought is this, based on these decisions, that if we carry this thing to a logical conclusion, this Underwood bill would be placing on the free list every machine of every kind and description which actuates a tool, in contradistinction to using that tool by hand.

SENATOR SMOOT. In other words, wherever there is a power other than hand power.

MR. GEIER. Yes. The decisions here (I have an abstract of them) are very sweeping. Here is a case, even, of a carpenter using a floor planer operated by an electric motor for smoothing off a wood floor. That is construed as a machine tool. Even worse than that, there is a case here where it was held in Treasury Decisions, volume 21, page 485, that a tool "used in punching or taking scratches out of window glass and consisted of a motor connected to a wheel or polishing tool" was a machine tool. That, of course, is going very far. If these decisions are right, then the machine tools of the future will embrace practically everything that is machinery.

SENATOR GALLINGER. Are those court decisions or decisions of the general appraisers?

MR. GEIER. The decision in the Myers case is a court decision.

SENATOR HEYBURN. We must take the decisions of the courts into consideration in this matter, because they would affect the rate of duty as between 30 per cent and 45 per cent and the free list.

MR. GEIER. Yes. This morning in looking over the imports, I find the classification, "Machines and machinery." I do not know what it means, but it was said yesterday that the importation of machine tools only amounted to $200,000, and therefore the manufacturers would not be harmed. But under this other classification, "Machines and machinery," there were $10,000,000 worth imported last year. So the Lord knows how much stuff would come in under these new rulings.

I touched yesterday, very briefly, upon the fact that the foreigner, particularly the German, could bring his product over here at a less freight rate from Germany than the domestic buyer or the man who buys machines for domestic use in Germany would pay. I have here some figures showing that the carload rate from Duesseldorf to Bremen for export is 93 pfennigs per 100 kilos. The carload rate for domestic use is 142 pfennigs per 100 kilos. The export rate from Chemnitz to Bremen is 142 pfennigs per 100 kilos, and the domestic rate is 336 pfennigs per 100 kilos. If you take the average size of machine tool which would come in here first, weighing, say, about 4000 lb., they could bring those machines to the seaboard of the United States at a cost of about $20, paying all of the ocean freight and railroad freight. With a machine of that size, figuring its price at 15 cents per lb., $600, which is a very conservative estimate, the transportation cost from the factory in Germany to New York City or Boston would be less than four per cent of the value of the machine. The rate from Cincinnati to Boston is 62½ cents on a 4000-lb. machine, and higher, of course, from further west. So, whereas in the argument presented in the House of Representatives it was claimed that on some of these articles on which the tariff is reduced the element of transportation would be a protection to the manufacturer of the United States, you can see here that that would not hold in our case, because the transportation charge is so small an item of the total cost.

German Testimony Offered

Now, we have given our testimony in support of our contention that we cannot stand this proposed reduction of the rate. Fortunately I have here testimony from the Germans themselves. It came into my hands only a few days ago. Here is a pamphlet issued by one of the greatest authorities in Germany on the subject of machine tools. It is entitled "Die Stellung der Deutschen Werkzeugmaschine auf dem Weltmarkte" (The Position of the German Machine Tool Industry in the World Market), and is an address delivered by Prof. Dr. Ing. G. Schlesinger, Professor in the Technical University of Berlin, Charlottenburg, at the annual convention of the German machine builders on April 6, 1911, in Berlin. He goes on to say that he gathered the data in the following way: "I have to thank 72 machine builders and 45 machine tool builders for their willing co-operation in getting the following data for the speech which I will present to-day. These consist practically of all the important German firms, and give therefore a complete picture of the actual conditions." I ask your thoughtful attention to what this man says, because it is not our own testimony; it is the testimony of the Germans, who, to our minds, are the most vital in the consideration of this industry that we are representing.

He says: "For the most part, the competition is confined only between Germany and the United States"—Please bear that in mind; that is what we claim, too, that our competitor of the future is the German—"and therefore we are confining our present comparison between these two countries." On page 1, paragraph 5, he goes on to say: "The first question to be answered is, How does it come that the German machine tool builders can make such strong claims for their product to-day? Does the product actually take such an important part in the machine building of Germany, and is there any danger of very strong importation from foreign countries? The statistics of the last 10 years show that the German export of machine tools to the whole world was 11,000 tons in 1900 and has increased to 58,000 tons in 1910; while the imports from America, which were approximately 7000 tons in 1900 decreased to 2000 tons in 1901 and increased again in 1906 to a maximum of 8800 tons, averaging 5500 tons per year." In other words, the imports of American machinery in Germany have declined from 7000 tons to an average of 5500 tons for the five years, whereas during the same period Germany's exports to the world have increased from 11,000 tons to 58,000 tons, or over 550 per cent.

How Germans Hope to Get Into Our Market

Page 2, paragraph 1, he says: "The reason for the present small export of German machine tools to America is the American tariff, which was formerly 45 per cent, and is now 30 per cent ad valorem. The German machine tool builder must therefore aim to build his machines so good and so cheap that they can climb over the American tariff wall, which is already happening in some instances."

There are men here today who have had very bitter experiences on that one point, and have already lost out to competition with the German machines, the Germans paying 30 per cent tariff. He continues: "The comparison of export and import figures shows that in the case of the German machine tool builders, in most types of machines, they can claim equality with the American product, since most export markets welcome our machines and purchase them in big quantities."

At page 2, paragraph 2, he says: "A comparison of Germany's imports and exports in other fields of machine building, such as agricultural machinery, steam engines, boilers, hoisting machinery and locomotives shows the important role which machine tools play for us in the economic life of our German nation. In exports machine tools take first place. The exports of locomotives follow very close."

On page 3, paragraph 2, he says: "The active, enterprising and comparatively small population of the United States, the high wages and the high cost of living forced the Americans long ago to a more extensive use of machines instead of hand labor than in any other country in the world. The beginning was the Civil War in 1864, at the outbreak of which, first of all, skilled labor was necessary to make firearms of every kind. This necessity forced them within a few years to develop machine tools for the manufacture of firearms. The principles underlying these machine tools are still fundamental to-day. The strongly developed talent of Americans for the practical led to a scientific development of machine building, and especially machine tools. It should be noted that German electrical manufacturers got their development from American influence. The close connections between the Allegemeine Elektricitats Gesellschaft with the General Electric Company, and the Union Elecktricitats Gesellschaft with the Thomson-Houston Company, were of the greatest importance in hastening the development of electrical machinery and its financial success. To-day the Germans are independent and stronger than their American competitors."

How Germany Learns from America

At page 4, paragraph 3, he says: "For a long time machine tool building was a matter of experience only, and

it is a strange circumstance that it had to be the Americans again who developed and placed upon the market between 1899 and 1900 what we now know as 'high speed steel,' which resulted in placing a machine tool on the market which was stronger than the existing standard machine, and therefore the German manufacturer was compelled to change his methods to meet existing conditions. In the meantime the American's progress in handiness, convenience in operation, and economic production was reproduced."

Page 4, paragraph 4: "American product in the meantime found general recognition in the whole of Europe, especially in Germany, where they always displayed a fondness for any foreign article or product."

Page 5, paragraph 1: "A reawakening of the German machine tool industry resulted from their following very closely the American example in the construction of their well-built and durable machines. Machine tools of large proportions, used especially by mining and rolling mills, also shipyards, because of their more scientific requirements, were the first to compete with American imports into the home market, and have to-day eliminated this competition completely."

I stop here a moment to recall to you that yesterday I was trying to point out to you the fact that, whereas our exports to-day are still of a considerable amount, the machines that compose those exports are different from what we exported 10 years ago; and here is testimony to that effect.

Page 5, paragraph 2: "No one can blame the German machine tool manufacturers if they copy a good thing wherever they find it. In the hard fight for existence the question of the origin of any idea or design fades into insignificance."

Page 5, paragraph 3: "What did we have to learn from the Americans, and what have we actually learned from them? Note as follows: The advantage of specialization; accuracy and good quality of machines for producing machine-finished product; handiness in operation or convenience; productive capacity and approved methods of testing machines."

Page 7, paragraph 1: "An examination of the special machinery built in Germany shows that the impression prevailing generally that the German machine tool engineer is not skilled is erroneous."

American Competition Declines in Germany

Page 10, paragraph 4: "In the case of boring machines, small and medium sizes, American competition was forced to completely withdraw." Again I want to say that 10 years ago a good many American boring mills were exported into Germany. Here is the testimony to prove my statement that those exports are lost and that what we have to-day is composed of new types of machines, highly organized and specialized, that they do not as yet make. "We only need mention one machine, namely, the Lucas boring mill, which is made very accurate and well constructed, but on the other hand is so high-priced that it cannot compete with the German market."

Page 12, paragraph 1: "A great number of German machine tool builders never criticise the high prices of the American builders, as it was largely through this high price of American manufacturers that the German builder's position was strengthened, and enabled him to effect a far-reaching competition in the world market."

Page 13, paragraph 1: "On those machines on which the German makers compete with American product the prices are insufficient, but they will not be increased until Germany increases her schedule of tariff on the import of American tools into Germany. That the Americans are afraid of losing their superior position is shown: 1. In issuing a report by the Department of Commerce and Labor by Captain Carden, entitled 'The Machine Tool Trade in Europe,' which deals especially with the German machine tool market. 2. The publication of a translation of the well-known American technical journal American Machinist in the German language. 3. Representation of machines of German make by agents who formerly (before 1900) only handled American machine tools."

I stop here a moment to say that there are a number of concerns in Europe, dealers in machinery, who built their business up on the importation of American machines, and who for many years sold only American machines but the pressure on the part of the German builder of machine tools has become so great that in the last five years or more they have gradually taken up the sale of German machines, because they can no longer sell the machines they were formerly able to import from this country.

Page 14, paragraph 2: "The German machine tool concerns, according to their own statement, export machine tools in great quantities to the United States. This applies especially to shears and punches." These, according to the last Treasury ruling, certainly would be machine tools.

Page 14, paragraph 3: "The German manufacturers declare that only since they have been specializing have they been able to make good profits; that export figures increased up to 60 per cent. of the gross output, the output per workman being 9000 marks ($2142), and this in a shop with about 400 men." That is a record of production, or testimony as to the efficiency of a plant, that will hardly find its equal in this country.

He goes on: "The steel trust [the United States Steel Corporation] buys continually from the Schmitzchen Feinwalzwerke, and many hundred shears from Pelse are exported to the United States. The same is true of lathes and gear-hobbing machines made by Reinecker and many other German concerns. Therefore the German machine tool builders should have sufficient courage to establish a counter-organization. They will sell their product even with a high tariff, if the product is good and worth its price."

Page 16, paragraph 3: "The decade from 1900 to 1910 has been controlled by the development of high speed steel, which brought about a change in the design of lathes and boring machines from the cone type to the single pulley or geared head machines. In this the German manufacturer has equalled the American, and to-day even holds a superior position in the development of drives on lathes and boring machines. In the case of milling machines, there is a strong tendency to follow American construction, with probably the one exception of the vertical machine of Droop and Rein. In workmanship and productive capacity the German machines are equal to the American."

Page 16, paragraph 5: "The construction of gear-hobbing machines is a German invention theoretically, and practically the first machine which could be used for manufacturing was a machine built by Reinecker. The gear-hobbing machine is one of the machine tools exported to America in very large quantities. The machine is often called the 'German machine,' and shows very clearly that the German machine has supplanted the American tool of this highly organized type of machine."

What Would Be Imported as Machine Tools

SENATOR HEYBURN. Under the ruling you have referred to, which includes machines, what would be the imports into this country? You are devoting your attention entirely to the interpretation you place upon it. Referring to the interpretation placed upon this paragraph 73, what would be the amount of imports? You spoke of millions of dollars.

MR. GEIER. The statistics for last year show that under the heading of "machinery and machines," which certainly, under the Treasury decisions, one would have a right to classify under "machine tools," the imports amounted last year, in addition to the machine-tool item of $191,000, to something over $10,000,000.

SENATOR HEYBURN. Do you hold that that $10,000,000 of importation would come in under the free list, under the decisions of the courts and of the Treasury Department?

MR. GEIER. If the Treasury rulings are correct, I would certainly hold that $10,000,000 worth of importations would be placed on the free list and a good many other things.

THE CHAIRMAN. You, of course, had no opportunity over in the House to say a word or to call attention to these decisions, had you, Mr. Geier?

MR. GEIER. Absolutely none, and the notice of this bill came as thunder out of a clear sky. We had no opportunities of any sort.

THE CHAIRMAN. There is no reason to suppose that the people over in the House knew about these decisions and their bearing on future importations, is there?

MR. GEIER. I cannot say. I have not had the opportunity of learning anything about it.

SENATOR HEYBURN. Do you think the Treasury decisions squarely hold that all of that class of machinery that you refer to as representing $10,000,000 would be put on the free list?

Treasury Decisions on Machine Tools

MR. GEIER. I think that is so. It would not take long to read the decisions, to give the committee a clear idea.

In re the protest of Georgia Pulp & Paper Mfg. Company, reported in volume 22, Treasury Decisions, part No. 5, for February 5, 1912, page 16, the United States Board of General Appraisers on January 22, 1912, held "that bark or rossing machines used in removing the bark from pulp wood, being power appliances for working on wood with cutting tools," were machine tools. General

Appraiser Fisher, in delivering the opinion of the board, said, page 16: "A machine tool is a term which in common use would without question embrace a power cutting machine used in wood working, and we hold the merchandise here in question to be machine tools."

In re protest W. White, reported in volume 22, No. 4, page 18, Treasury Decisions, January 25, 1912, it was held "that a woodworking machine known as a mortiser" was a machine tool.

SENATOR HEYBURN. The whole machine?

MR. GEIER. The whole machine.

SENATOR HEYBURN. And not the mortising tool alone?

MR. GEIER. No; the machine. In re protest W. Allison, reported in volume No. 22, No. 1, Treasury Decisions, page 25, January 4, 1912, it was held that "a combined jogging and punching machine" was a machine tool.

In re protest American Window Plate Glass Company, reported in volume 21, Treasury Decisions, page 485, decided December 31, 1911, it was held that a tool "used in punching or taking scratches out of window glass and consisted of a motor connected to a wheel or polishing tool" was a machine tool.

SENATOR GALLINGER. Those are all Treasury decisions. Have you a court decision?

MR. GEIER. Here is the court decision: Myers vs. United States, reported in volume 20, Treasury Decisions, page 192, is the leading case upon the subject, having been decided by the United States Court of Customs Appeals January 25, 1911. In this case it was held that "floor planers [planers for wood floors] with an electric motor" were machine tools. The court calls attention to the fact that the floor planers in question were portable and only put in operation by the hand of man and that they resembled in general style lawn mowers propelled by hand. I should think upon this decision lawn mowers are machine tools.

SENATOR HEYBURN. Did they hold that a lawn mower was a machine tool?

MR. GEIER. This case shows the broad scope given to the term "machine tools" as found in the tariff act. Again ,in re protest American Steel & Wire Company, decided December 5, 1910, reported in volume 19, Treasury Decisions, page 1193, it was held that "cold-rolling mills, slitting machines, scale removing machines and straightening machines" were machine tools.

In re protest Schuchardt & Schutte, decided November 30, 1910, reported in volume 19, Treasury Decisions, page 1191, it was held that an "automatic gear hobbing or cutting machine" was a machine tool. On this last decision there is no difference among us in the trade. We would have classified that, ourselves, as a machine tool. But the other decisions are something entirely outside of our idea of what a machine tool is; and therefore it certainly throws down the bars, and to our minds puts on the free list, together with these machine tools, a great many other classes and descriptions of manufactures that heretofore have not been considered machine tools, and which, under the Underwood bill it was intended, at least as I understand the bill, to still protect with 25 per cent.

SENATOR HEYBURN. What is the rate of duty on that commodity that represents imports of $10,000,000 under the existing law?

MR. GEIER. Forty-five per cent.

SENATOR HEYBURN. That would be $4,500,000 in duty alone that we would lose on that, under this proposed legislation?

MR. GEIER. Yes, sir.

SENATOR GALLINGER. Assuming that these articles do not get on the free list, what effect would it have upon your industry if the duty were reduced to the point named in the Underwood bill?

Profits of Machine Tool Builders

MR. GEIER. I am coming to that directly, if you will permit me. I want to show you, finally, the net result of that whole proposition. It might be claimed by some that our loss of the export business in Germany, or elsewhere, is due to the fact that we are charging inordinate profits. That would be a very pertinent question. We have endeavored, in the short time at our disposal, to get statistics from our members as to what their earnings for the last 10 years have been, on the amount of capital invested; and our figures show (those that we have been able to get) that the average earnings in the machine tool industry for the last 10 years are a little less than 9 per cent on the capital invested. Inquiry was made of 67 concerns; and I submit that that is a reasonable profit.

SENATOR HEYBURN. Does that represent all years, or what you would call fat years?

MR. GEIER. It is the average over 10 years. It takes in the good years with the bad ones.

SENATOR HEYBURN. Were there any years in which there was no profit?

MR. GEIER. Undoubtedly. In fact, right now, we are just emerging——

SENATOR HEYBURN. Then there must have been some years that were rather fat?

MR. GEIER. I will quote Mr. Schwab in that respect that we need some fat years to make up for the lean.

SENATOR HEYBURN. Yes; I recognize that proposition. I simply wanted to get the fact.

MR. GEIER. I cannot submit any absolute evidence, but from my own personal knowledge from reading German papers in which are quoted the earnings of the German concerns, the German machine tool builders certainly make as much as that. We have evidence that they declare larger dividends than I have seen declared in American machine tool shops.

SENATOR SMOOT. You folks ought to go into the making of automobiles. They will protect those all right.

SENATOR JOHNSON. You spoke about $67,000,000 being invested. What does that represent? Does it represent a cash investment or plants taken at certain prices?

MR. GEIER. My statement was that the evidence I submitted was gathered from 67 concerns. You will recall that we claim that the total capitalization of the 225 machine tool building concerns in this country is about $40,000,000.

SENATOR JOHNSON. That is their stock capitalization?

MR. GEIER. The 67 concerns that reported on this inquiry represent a capitalization of $21,000,000.

SENATOR JOHNSON. That is their stock capitalization?

MR. GEIER. That is the full investment, capital and surplus.

SENATOR JOHNSON. What do you mean by "investment." Do you mean money invested?

MR. GEIER. Lands, buildings, machinery, materials, finished and unfinished stock on hand, and the necessary money to run the business with. I do not think there is any water in the capitalization of the machine tool industry of this country.

SENATOR HEYBURN. Is there any combination among those concerns.

MR. GEIER. Among these 225 concerns?

SENATOR HEYBURN. Among the lesser number that you spoke of?

MR. GEIER. Absolutely no combination of any sort or description.

SENATOR HEYBURN. Were the plants bought up pursuant to a plan of consolidation, as was attempted in the steel business and iron and hardware business?

MR. GEIER. No; and there is no chance in the future of that thing happening because the business, in the first place, is not profitable enough to induce any scheme of that sort; and second, it is a business in which very much depends upon the individual ingenuity and skill of a group of men.

SENATOR HEYBURN. A few years ago in the hardware business of the United States and certain branches of the iron business promoters took options on nearly all the plants of any consequence, with a view of forming a combination. Has there been anything of that kind in your business?

No Machine Tool Combine Ever Attempted

MR. GEIER. There has never been any effort of that kind. I am beginning to wish there might be. For just a moment now I want to show you the situation. Our exports in this line of business in the three years 1898 to 1900 amounted to $18,000,000, or an average of $6,788,000 per annum, to all countries. In that same period Germany bought from us an average of $2,262,723 worth. Understand, these figures are on metal working machinery, which includes our machine tools. These are Government statistics analyzed for the years.

SENATOR HEYBURN. Is it your idea that those figures represent the exports on the basis of the decisions of the Treasury Department?

MR. GEIER. No.

SENATOR HEYBURN. Can you say, off-hand, what figures would represent the exports on the basis of the decision?

MR. GEIER. I would not be prepared to say. It would be very much larger than this. During that first period of three years, which marks the beginning of the German machine tool industry development, Germany bought 37 per cent of these total exports of metal working machinery. Take the next 10 years, beginning with 1901. Our exports to all countries of metal working machinery averaged $5,605,000. It had gone down from $6,788,000. Germany's portion was reduced from 37 per cent to 24 per cent.

How Germany Cuts Into Our Trade with Other Countries

Now to show what is happening in the neutral markets like France. I have a table here beginning with 1895 and going up to 1910. Here, again, these statements include machines and machinery, which of course covers more than

machine tools. It includes more things than machine tools, but it is a similar class of products, and shows our relative ability to compete with Germany in France. We began in 1895, and we sent over there 5,244,000 francs of exports. We reached the high water mark in 1907 of 54,739,000 francs. Since then we have declined, so that in 1910 we only shipped into France 46,000,000 francs—a decrease of about 16 per cent since 1907. Taking the same period for Germany, they began with exports to France of 16,000,000 francs in 1905. Taking the high water mark for us, in 1907, they had reached 76,000,000 francs, and they have steadily gone on since that time, until in 1910 France bought from Germany to the extent of 111,000,000 francs, or an increase of 50 per cent during the period in which our exports to France declined 16 per cent.

I was able to also get the comparisons with Germany of the purchase of machinery by Belgium for 1906, 1907, and 1908. This is not given in money; it is given in weight. The United States in 1906 sent to Belgium 487,497 kilos; in 1907, 713,725 kilos; in 1908, 659,584 kilos. Germany began in 1906 with 6,970,000 kilos; in 1907, 9,464,000 kilos; and in 1908, 10,479,000 kilos. Our proportion, you see, is less than 6 per cent of that.

How Other Machinery Is Still Protected

Now, gentlemen, I want to call your attention to this fact, that in this bill automobiles, bicycles and motorcycles are still protected 40 per cent; muskets, muzzle-loading shot guns and rifles, 15 per cent; breech-loading shotguns and rifles, and pistols, and parts thereof, 35 per cent; watch movements, including time detectors, 35 per cent, and all other products—and this is the important thing to remember—into which metal of any kind enters in any degree, 25 per cent. I will enumerate some of the kinds of machines that are still in this same bill protected by at least 25 per cent: Machines for shoe-making, paper and pulp, leather working, confectionery, cotton, woolen, knitting, bottle-making, steam pumps, electrical machinery, water meters, adding machines, sugar, rolling mill, rubber, road making, rock drilling, mining, pneumatic, hydraulic presses, cotton ginning, oil well, agricultural, dairy, laundry, traction engines, cement, brick making, metal molding, rotary blowers, ventilating, can making, hat making, straw braiding, steam shovels, barb wire, wire weaving, dredging, cranes jib, cranes traveling, cranes locomotive, hoisting machinery, elevators, conveyor, grain elevating, flour making, stone crushing, internal combustion engines, metal drawing, tube drawing, wire drawing, pin making, wind mills, hot air engines, chain making, glass making, paper box making, envelope making, weighing machines, scales, paint making, chemical machinery, goldsmith machinery, button making, butchers, coffee machinery, dental machinery, telescopes, microscopes, laboratory apparatus, fertilizer, filtering machinery, telephone machines, telegraph machines, flying machines, injectors, water wheels, ice making, vacuum cleaning, air compressors, bakers' machinery, cotton seed oil, cereal making, gun making, nail making, and many others we have not had time to list.

SENATOR GALLINGER. Too numerous to mention.

MR. GEIER. These are all protected in the proposed Underwood bill by 25 per cent.

SENATOR MCCUMBER. It would make that clearer to us if you would tell us what is left out.

MR. GEIER. The things that are left out, involved in this classification, are printing presses, machine tools, cash registers, and so forth. There are seven of these items on the free list.

SENATOR JOHNSON. You told us a while ago that under the interpretation placed by the court upon the term "machine tool," $10,000,000, in your opinion, would come in free. Would some of those machines be included on those you have now read as being dutiable under the proposed bill?

MR. GEIER. Yes, sir.

SENATOR JOHNSON. They run into each other?

MR. GEIER. Yes, sir. That item in the Underwood bill is a basket clause. It simply says metal products, the iron and steel schedule, in which any kind of metal is used. That would, of course, take in all these different machines I have enumerated. I would like to call your attention to the fact that this bill is discriminatory and unjust in this respect: It puts a comparatively few items on the free list and leaves others protected at various rates—up to 40 per cent, on automobiles; whereas, as a matter of fact, the men whose products are put on the free list, including the machine tool builders, are still left to compete with every other manufacturer in which the same kind of labor and the same kind of material enter. An automobile is protected under this bill, the duty being only reduced from 45 to 40 per cent. It is a highly profitable business.

SENATOR GALLINGER. Can you give us any reason why that large duty was left on automobiles?

MR. GEIER. I have not the slightest idea. The automobile business has sprung up in the past few years, and has swept our shops clean, almost, of all the labor that we have developed over a period of years. They have taken the ready-made product of our efficient labor and transferred it to their plants, because they could, of course, pay a higher rate because they got a higher profit out of their product than we could.

SENATOR HEYBURN. Do they, as a matter of fact, pay them a higher price for the same class of labor?

The Automobile Industry and the Machine Tool Labor Supply

MR. GEIER. Most decidedly. They have raised for us the cost of our manufacturing very considerably by the fact that they got these men immediately and took them out of our plants and paid them almost any price because they could afford to do so. But here are all the other lines of business. Take the electrical manufacturing business, a business that is much larger than ours; there is one concern that is two or three times as big, both in its capitalization and its volume of product, as the entire machine tool industry represented here to-day. So there are other businesses. The automobile business is also two or three times as big as the machine tool business; and so with many of these other items I have given you here. In other words, there are hundreds of thousands of men who are employed—machinists, skilled and unskilled—in these plants, and we are asked to continue to compete with all those manufacturers, and necessarily must pay the same price for our labor that we pay now, and compete also with the material, when our product is subjected to the importation from a market where the cost of labor is one-half that which we have to deal with.

SENATOR GALLINGER. So that it is your view that that somewhat violent reduction of the duty would be disastrous to your industry. Is that correct?

MR. GEIER. That is correct; and I want to support that opinion by evidence showing you just what would happen.

SENATOR HEYBURN. Could all of your employees, if you went out of business, get employment in the automobile shops?

MR. GEIER. I do not think so. I am now going to give you some data showing you the facts of the competition of the foreign machines, the price laid down in New York, as against American competing machines, f.o.b. their respective factories.

Prices of Foreign and American Tools Compared

This is based on the prices to the German consumer now ruling, not on the lower German export prices, which undoubtedly would follow if you tempt them with free entry into this country. First of all, I have an exhibit here. There you see two typical machines. You can see they are very similar in construction. In fact, in this case this happens to be our former representative in Germany, who has now launched into the manufacture of our machines in Germany. We found recently this machine being quoted for a technical school in Bridgeport, Conn., and I have the absolute prices on it, and there is no dream about it. It is a reality. The price quoted on that machine delivered in New York, a German machine, with a 30 per cent duty, was $350, as against our price, f.o.b. factory, of $425. That would indicate they could undersell us on that machine, after paying the 30 per cent duty, 20 per cent.

SENATOR JOHNSON. Is that one of the highly specialized machines which you export?

MR. GEIER. This is one of the simpler machines that we used to export.

SENATOR JOHNSON. Do you not export it now?

MR. GEIER. This particular machine no longer sells in Europe. It is driven out by just this sort of thing. Here is another exhibit.

SENATOR HEYBURN. You say it no longer sells in Europe. Is it because of the fact it is being manufactured there and you could not compete with it; is that the idea?

MR. GEIER. Precisely.

SENATOR HEYBURN. It is not because it has gone out of the market?

MR. GEIER. Oh, no! we sell them in this country still. Here is another exhibit showing an American machine and a corresponding machine made in Germany. The price of the No. 2 plain size of that machine, laid down in New York—allowing 5 per cent for bringing it over—is $831.60. The price of the corresponding machine made in this country, f.o.b. factory, is $1550. The next one is a 2-universal, the foreign price $1020, against $1600 American. Again, a German machine, $1260, as against $1850. They undersell us from 32 to 47 per cent on the basis of the prices now ruling in Germany, not considering the German export price.

SENATOR SMOOT. Is that German machine just as good as the American machine?

MR. GEIER. I said yesterday that I would not want to admit that in milling machines the Germans have equalled us. But they are making very good machines; and on the similar types, where the question of quality is not the all-important factor, they are making machines that could be brought over here very easily.

SENATOR HEYBURN. Are the German machines good enough to displace your machines if they could come in on equal terms?

MR. GEIER. In this country, like any country, all factories do not buy strictly high grade machines. We have in this country machines of varying grades. There are some repair shops where the strictly high grade machines would not be bought in this country, and in those places, and in a good many manufacturing establishments, the cheaper, less high-grade machines would be bought, and the German machine would be fully equal to those requirements. That is a great part of our business in this country. The strictly high-grade machine in every branch of business is, after all, the smaller portion of the total quantity used.

SENATOR HEYBURN. The underlying principle of the protective tariff is to prevent the displacement of an equivalent article in our market; that is the effect of free trade. My question was whether or not the German machines were of sufficiently high grade to displace the machines you otherwise would supply?

MR. GEIER. In a great many instances they would be perfectly competent to displace the American product, if there was no protection. Here is a case I want you to notice. This is an American designed machine; it happens to be my own. The other is a German machine. The price of the German machine is $882, as against our price of $1025. Here is another sized machine of the same type, $1049, German, as against $1275. Here is $1050 on another size, as against our price, $1275. I am always quoting these prices delivered in New York.

SENATOR SMOOT. With the duty paid?

MR. GEIER. With no duty. Here is an illustration. We are talking a good deal about highly organized machines.

SENATOR HEYBURN. You say those prices of the German machines delivered in New York do not take into consideration the duty that they pay under existing tariffs?

MR. GEIER. No. These are possible consumers' prices in New York when admitted free. Here is another illustration, showing how closely these machines are imitated. I call your attention again to the fact that the American tool builder has an expense of at least 5 per cent on his volume of output in the way of design that the German, in this instance, saves. He simply waits until we have thoroughly developed the product, and then takes the finished product, you see, and duplicates it.

SENATOR SMOOT. Why do you not get patents in Germany on all these improvements in machinery?

MR. GEIER. For a very good reason. Even in this country we cannot any longer get fundamental patents on our machines. We can get elements of them patented, and it becomes increasingly difficult in foreign countries even to get patents on the elements. Most of us are trying to protect ourselves as far as we can, but the protection is practically nil. Another thing you must remember is that most foreign countries who give patents exact the further obligation of manufacturing over there. Here I have some lathes, which are the simpler types of machines, showing the percentages by which the American lathes could be undersold, ranging from 21 per cent to 34 per cent. Here are planers, where the difference would be even greater, the ranges of underselling being from 24 to 56 per cent; on shapers it is 34 per cent. Here is a case where the Ithaca Machine Company, of New York, which, by the way, under this new bill, has its machinery protected 25 per cent, has already bought some German machines at a price, paying the duty of 30 per cent, 9 per cent less than the price quoted by the American manufacturer of that type of machine. Here is a bevel gear machine, a machine originated in this country. The price in New York of the German machine would be $945, as against $1425 for the American machine.

SENATOR HEYBURN. That is plus the duty on the German machine?

MR. GEIER. No, that is not plus the duty. So it goes on in different lists. Here is one 8 per cent only. But you have to know in that case that that machine is of a larger capacity than the corresponding machine made over here. It is sometimes difficult to get absolutely identical machines as to design and capacity. Here is another case of a gear cutting machine, where the difference would be 22 per cent. Coming to the radial drilling machines, here is a big boring machine. The difference is 41 per cent. Here is another case where the difference is 48 per cent, and here is one of 51 per cent. Now I would like to have about six minutes more to read you a summary on this question.

SENATOR JOHNSON. Let me ask you a question before you begin that. You have already said that your exportations from this country of machine tools are about $5,000,000.

MR. GEIER. Four and a half millions, I stated yesterday, estimated.

SENATOR JOHNSON. Can you furnish a statement of what machines are represented by those exportations?

MR. GEIER. We could, if we had lots of time. It depends on the willingness of all the manufacturers of those machines to give us that data.

The Kind of Tools Now Exported

SENATOR JOHNSON. From your general knowledge of business, what kind of machines are you exporting?

MR. GEIER. The machines we are exporting to-day consist largely of what I would call the highly organized machines.

SENATOR JOHNSON. Leave that out, and specify what are the machines.

MR. GEIER. Automatic screw machines, universal grinding machines, universal milling machines, and particularly the machines of the more recent designs in milling machines, what we call the gear drilling machines; automatic turret machinery, machines that, instead of doing the work on a lathe, now do a certain work automatically. And there are some few gear cutting machines still sold over there; also some lathes of highly organized design, as against the simple type of lathes.

SENATOR JOHNSON. And planers?

MR. GEIER. Planers are practically out of the market. Occasionally some friend of the American machine, either owning a shop controlled by Americans, or having American machines throughout his plant, will buy a planer. But that is so rare that it is practically negligible. It is the same way with the shapers. There is a man in this room from the Hendey Machine Company, Tolland, Conn., who used to get orders for shapers, which is a very high grade machine, 50 at a time. I doubt whether he has sold 50 in the last two years. So there would be instance after instance where a man could get up and testify that he formerly sold this type of machine in great numbers, and that the business is entirely gone.

SENATOR JOHNSON. Have you stated, in a general way, all the machine tools that are shipped abroad?

MR. GEIER. Yes, sir.

SENATOR JOHNSON. In the statement you have given now?

MR. GEIER. Automatic screw machines I have given you, turret machines, and things of that type. I want to make this statement, which may prejudice my case, but if you will investigate it, it will not. I have referred before to the fact that in the last 12 to 18 months particularly, Germany and England have been enjoying a period of prosperity that they have not had for a decade, and that the German and English tool builders are so busy that they cannot make prompt deliveries of their machines, and that has given us temporarily, especially during the past six or eight months, an opportunity, because we had a slack demand in this country, with our warehouses full of finished products, and because of our ability to make immediate shipment, to get in again temporarily, but it is a temporary condition which surely will pass away from us as soon as the German tool builder catches up. I might further say that we have lots of letters and evidence to indicate from our former representatives that they no longer can market our machines. It is a voluminous proposition, and would probably take too much time. There is one telegram that came in yesterday that might be pertinent, from Takata & Co., of New York, as follows:

> FRED A. GEIER, 805 Westory Building, Washington, D. C.:
>
> We are large exporters to Japan and it is our experience that American machine tools of standard design cannot be sold there to any extent because continental and British machines can be had much cheaper. We are, of course, anxious to build up the export business of our house and use our utmost endeavor to secure Japanese orders for machinery as well as other American products. We can only sell in Japan American machine tools of special design in which the question of price is not a controlling factor.
>
> EDWARD L. YOUNG, Manager, Takata & Co.

Mr. Geier then submitted the following formal statement:

Summary of Argument by the Machine Tool Builders

Contending that an amendment should be passed striking out the item "machine tools" from the free list in the Underwood tariff bill (fixing rates for metals and metal products—H. R. 18,642)—and continuing this item under the tariff rate of 30 per cent. as fixed by the present law, we submit, first, that there is no specific principle of tariff

making under which the placing of machine tools on the free list can be justified.

(a) Any one believing in the American policy of promoting American manufacturing must, of course, strenuously oppose the placing of "machine tools" on the free list, since it can be absolutely proved that the industry needs the reasonable protection of 30 per cent. now afforded. Under the Payne law this rate on machine tools was reduced from 45 to 30 per cent. A study and close analysis of cost conditions as they exist to-day would fully warrant a restoration of the 45 per cent. rate from the viewpoint of a reasonable protective principle in tariff making.

(b) Placing machine tools on the free list is directly contradictory to that principle of tariff making which makes production of revenue the prime consideration. The statistics show that the United States Government cleared $57,324 in revenues on importations into this country of foreign-made machine tools in the fiscal year 1911. Under the existing 30 per cent. tariff rate this figure will rapidly increase year by year. (See charts of German exports accompanying brief.)

Not in Accord with Free Trade Principles

(c) The principle of absolute free trade as a basis for tariff making would certainly presuppose uniformly fair application of that principle to all commodities and industries alike, especially upon all raw material entering into finished products, but this bill, covering innumerable items of material and innumerable items of finished product into which any kind of metal enters, places only seven items on the free list—one of which is "machine tools." By placing machine tools on the free list, this bill compels the American machine tool industry to compete on the one hand with low-priced foreign labor about one-half our wage rate but equally efficient with ours, and on the other hand with all other employers of American labor in this country (all of whose products are still protected by this bill) using identically the same clause of labor as employed in the machine tool industry and who would continue to pay the higher American scale of wages. At the same time, this bill establishes a tariff rate on every item of material which goes into the construction of a machine tool, and while some of these rates may be lower than the present existing rates, yet they will not permit the American machine tool builder to purchase one single item of his material at any lower price than he pays to-day under the existing tariff schedule. (See schedule of prices accompanying brief.) We submit, therefore, that placing "machine tools" on the free list is not in accordance with the established principle of absolute free trade as a basis for tariff making.

(d) There remains one ground upon which it might be claimed that placing seven items of finished product in this entire schedule on the free list under this measure might be justified, and that is that these seven items are produced in America under monopolistic control and have special patent right protection, which results in abnormal earnings for the capital employed and excessive prices on these products to the American consumer. The items of finished product placed on the free list by this bill are as follows: Cash registers, linotype machines, sewing machines, typewriting machines, printing presses, and tar and oil spreading machines.

The Machine Tool Industry No Monopoly

We are not concerned with establishing whether the industries controlling the first six items are monopolistic in character or not, or whether they are protected under patent rights, or whether placing these items on the free list in this bill (should it become a law) will or will not lower the prices on these items to the American consumer. However, absolute facts can be presented to show that the machine tool industry of America does not bear the faintest semblance to monopoly, but, on the other hand, that it exists under most highly competitive conditions. (See schedule showing distribution of capital and statement of average earnings accompanying brief.) Upward of 225 concerns are engaged in the manufacture of machine tools in this country, and results show that their average profits over a period of 10 years are only such as to yield not more than a fair rate of interest on the actual capital invested, while, at the same time, the class of labor it employs is well paid and well cared for. In other words, facts are at hand to show that the American consumer is not being charged prices for American machine tools beyond the point sufficient to yield a fair interest on the actual investment to the American manufacturer of machine tools, so that on this principle also of tariff making no justification remains for placing machine tools on the free list in this bill.

Second, proof is at hand to show that the present 30 per cent. tariff on machine tools does not fully equalize the difference in cost of labor here and abroad, special reference being had to Germany—our most formidable competitor.

We have the statistics to show that the imports of German machine tools, even under the existing tariff rate of 30 per cent., will rapidly increase. We have proof to show that under free trade and on the basis of regular prices now quoted by our German competitors in Germany (not the lower export price, in accordance with the regular German custom, which is the price we would actually have to meet here under free trade) German copies of American machine tools, or German competitive machines equal, or superior, to the American machines, would flood this country at an average of 30 per cent. to 40 per cent. under the price of the American machine tool. (See tables accompanying brief showing landed price in New York on competing German make of machine as against the price of the equivalent American made machine.) Germany has in the last few years out-distanced us in the fight for machine tool trade in export markets, where we meet upon equal ground. France is a conspicuous example where the sale of American machine tools has been rapidly declining, while the sale of German machine tools has been rapidly increasing. In 1900 German and American machinery and machine tools sold in France to about an equal amount—35,000,000 francs. From that date on Germany has been rapidly gaining over America, until in 1910 she sold 110,000,000 francs of machinery and machine tools to France, while America sold only 45,000,000 francs. This 30 per cent. tariff rate, therefore, is needed to equalize the difference in cost here and abroad. To put this industry on the free list and at the same time to give it no reduction in the cost of material or the cost of wages and overhead means to destroy it.

America Might Lose an Industry

Third, keep in mind that while this bill proposes to open our market free to our German competitors and free to all other foreign competitors, it does not secure for us any relief whatever in the tariff rates levied against us by foreign countries, in some cases, practically prohibitive. Canada, for instance, would continue a tariff rate against machine tools of 27½ per cent. ad valorem, while our markets would be open free to the Canadian manufacturers of machine tools. There would remain only one logical way in which the American machine tool manufacturers could ultimately meet this foreign competition, and that would be to move their plants to Canada, and especially to Germany, where they could make these same machines at lower costs and ship them into the American markets free on equal basis with the Germans, and, at the same time, meet the German competitor in his own market under equal conditions of cost, without the tariff handicap. But this would simply mean that America would lose an industry while our foreign competitors would gain one.

Fourth, if it should be argued that, under this provision, foreign machine tools of equal value with the American machine tools would come into this market and sell to the American consumer for his benefit at an average of 30 per cent. under the existing American prices, and that therefore the American consumer is entitled to this benefit, notwithstanding the fact that such a provision would destroy the American machine tool industry, then why does not this bill put all other finished metal products on the free list, wherever the foreign made commodity would thereby come into America and sell at a lower price to the American consumer than does the similar American product? This course might work disaster on American industry as a whole, but at least it would not single out and discriminate against any single American industry, as does this provision in the Underwood bill discriminate against the American machine tool industry.

Fifth, one of the suggestions which has been advanced as being a possible ground on which "machine tools" have been placed on the free list in this bill is that this American product has been largely exported to foreign countries, while the imports of foreign machine tools have been small.

Exports of Machine Tools Diminishing

(a) It can be absolutely established by abundant data that the American exports of machine tools are diminishing, especially in Germany, from which country we would suffer most under free trade conditions. The simpler types of American machine tools, such as planers, shapers, lathes, drills (manufactured by 85 per cent. of the American concerns engaged in this industry) can no longer be sold in Germany, except to some degree under an occasional abnormal trade demand, when our German competitors are oversold and cannot make delivery. Some few highly organized and more or less special American machine tools still have a market in Germany, but it can only be a temporary one. It is to be noted that the consumer or user of these tools in foreign countries pays a higher, and in Germany and other protected countries a very considerable higher, price for them than does the American consumer or user. (See exhibit in brief.)

Referring to report No. 260 accompanying this bill (page 831) it should be carefully noted that the figures there given for exports are listed under the following heading: "Metal-working machinery (including metal-working machine tools)." It is apparent that if these figures were compiled to indicate the exports of machine tools only they would be very greatly reduced, probably to considerably less than one-half, and even this corrected figure would be made up largely of the more highly organized and automatic type of machine tools, whose manufacture is confined to the other 15 per cent. of the American machine tool manufacturers.

Out of the total of 221 firms selected at random from the advertisers of several of the leading trade papers, 120 are manufacturers of machine tools and 101 are manufacturers of metal-working machinery, both coming under this export classification. Taking this same list, Dun's agency rates seven of the machine tool concerns at over $1,000,000, and 49 under $75,000, while it rates 18 of the metal-working machinery firms at over $1,000,000 and only 28 under $75,000. In the 101 manufacturers of metal-working machinery are included producers of such diversified manufacture as boiler-making machinery, punches, shears, presses, plate rolling and bending machines, riveters and other sheet metal working appliances, also presses for metal working, metallurgical furnaces, bench vises, hoists, small cranes, jacks, hammers, forges, blowers, and other blacksmith implements, as well as a vast number of other machines and appliances used in the metal working industries—all of which products would come under the Government classification of "exports of metal-working machinery."

Imports of Machine Tools Increasing

(b) It is claimed that the imports of foreign machine tools have been small, but an analysis will show that the percentage of increase is exceedingly rapid when it is considered that only a few years ago there were practically no imports on this item, while in 1911 the imports rose to $191,082; notwithstanding that during this year the German plants have been oversold and not able to take care of the demand in their own country, while the American machine tool plants have been running short time because of the low demand here. Under the present conditions of competition, with the existing 30 per cent. tariff rate, this percentage will rapidly increase. Each year will show on the average a rapidly decreasing export figure and a rapidly increasing import figure.

(c) However, why should an American industry be penalized, so long as it can be absolutely shown that its average profit on actual capital is only such as to pay a fair rate of interest on investment, because it has been enterprising enough to secure, in the past at least, orders from some of the foreign markets, and thereby employ American material, American labor and American capital to fill these orders? The logical conclusion on these premises would be that the American Government should encourage, rather than penalize, the American machine tool builder, in his effort to maintain a foreign trade already rapidly disappearing on many types of tools in such countries as Germany.

Sixth, the above propositions, impartially considered, can only drive us to the conclusion that "machine tools" were placed on the free list in this bill through the absence of specific and properly interpreted statistics and information.

We appear, therefore, for the passing of an amendment to correct this error in both Houses of Congress, thereby eliminating "machine tools" from the free list in this bill and continuing them under the present tariff rate of 30 per cent.

Restoration of 45 Per Cent. Duty Is Warranted

Seventh, a committee of the American Builders' Association appeared voluntarily before the Ways and Means Committee of the House preceding the enactment of the present 1909 tariff law, agreeing to a reduction of the tariff rate from 45 per cent. to 30 per cent. as an absolute minimum. This was done in an effort to hold down foreign tariffs, at that time threatening to be advanced, and to obtain for us the most favored rates in all countries, with the hope that our export trade could be at least temporarily prolonged. It was believed at that time (not anticipating the rapid recent advances made, especially by the German machine tool builders) that 30 per cent. would approximately equalize the difference in cost, with a maximum rate of 37½ per cent. wherever we failed to obtain the most favored rate. At that time, for the year 1908, the imports of foreign machine tools were inconsiderable. A study of the relative cost conditions at the present time, and a conservative judgment of the greatly increased competition we must meet from Germany in the next few years, would fully warrant a restoration of the previous 45 per cent. rate.

The above facts are recited only to show that already the American machine tool industry has gone on record as desiring only such a minimum tariff rate as will fairly equalize the difference in the costs here and abroad, and only on such elements of cost as adhere in the fundamental economic differences in the two countries. We want no protection for our brains or our energy. We are willing and ready to have all the conditions of our industry thoroughly, impartially and scientifically investigated, and are ready to abide by any tariff rate that may fairly result from an investigation of this character.

Testimony of Frank C. B. Page

Following is a portion of the testimony of Frank C. B. Page, vice-president E. W. Bliss Company, Brooklyn, N. Y., given before the Finance Committee, February 15:

MR. PAGE. We employ about 1800 men in our factory. Most of these men are what are called skilled mechanics. Our product is machinery for working metal, principally sheet metal. We make a line of punching, cutting, shearing, forming and forging machinery, and special machinery.

We have always looked upon this as coming under the head of machinery not otherwise specified in the tariff list; but in view of the ambiguity and uncertainty which exist regarding the classification, and in view of certain rulings by the Treasury Department, we believe that a great many of our machines would be considered machine tools and put on the free list. We get our business from a very large field, from manufacturers of kitchen ware, stoves, lamps, ranges, and all kinds of sheet metal articles. I should judge there are about 50 manufacturing concerns in the same general line that we are in this country.

We do a business of approximately $3,000,000 a year. Of that we export about $250,000. Our export prices are the same as our domestic prices; that is, the same at New York; so that the foreign consumer pays a higher price for what we export at the destination than the consumer in this country, due, of course, to carriage, duty, and so forth.

I should divide our product into two classes: Machinery of a very special nature and machinery of what might be termed a regular or standard nature. The standard machinery is of the more simple and standard types, while the special machinery runs into automatic and very intricate machinery.

The Class of Bliss Machines Exported

The machinery that we export is composed almost entirely of the intricate and special machinery. The small amount of standard machinery which we export is only incidental to the special machinery. I mention this for the reason that we find it practically impossible to sell standard lines of machinery abroad, in view of the competition which exists, principally on the part of the Germans and English. I mention this as an explanation of how we get this export business.

In our line of manufacture, the cost of labor is the main element. Our figures show that labor is 70 per cent., material 20 per cent., and other expenses, such as salaries and administrative charges, 10 per cent. Figuring materials at 20 per cent. does not eliminate the original labor costs that enter into that. We do not buy the raw material. We buy pig iron and bar steel and sheet steel and steel in various shapes, and other materials of like nature.

Some years ago, due to slackness of business in this country, we made a strong bid for foreign business and sent representatives abroad, and did build up a small additional business to the extent of probably $300,000 a year. Five or six or seven years ago we began to experience great difficulty in holding that business; in fact, it was getting away from us, due to the German competition. This necessitated our inaugurating factories in Paris and one in London, for the sole purpose of being able to compete and avail ourselves of the lower prices of labor. We located in Paris for the reason that France at that time was an open field; there were no manufacturers of any moment in that country. They were large purchasers from Germany. We have been able to hold our business there in France, and it has also helped us in our export business from this country, because a great deal of our product is in the nature of special machinery which does not sell alone on price, but on the question of production, economy of production; and in that line we are able to do some business abroad to the extent of about $250,000 a year.

Wages Abroad and in Brooklyn

SENATOR HEYBURN. It would seem to be particularly appropriate, at this point, for you to give the comparative wages in your own establishment in France and your establishment in this country.

MR. PAGE. I will give you the wages of three classes

of skilled labor that apply very largely to our manufactures: Machinists, Brooklyn, 30 cents per hour; Paris, 17 cents. Die makers—a very high class of labor of which we use a great deal—36 cents in Brooklyn; 18 cents in Paris. Blacksmiths, 37 cents in Brooklyn; 22 cents in Paris. I have eliminated the fractions, and am just giving the cents.

From this it will be seen that the cost of labor in France in our line is a trifle over 50 per cent. of what we pay in Brooklyn. While I have not the exact figures to give you that pertain to our London factory, they are, if anything, a trifle less than in Paris. So that the comparison there would be even more disadvantageous for us.

I think it well to state here, after having given these labor costs, that we have some German competition right in this country. There is a series of punching presses here which we believe would, in all probability, be ruled as coming under the machine tool heading. The first press made by Edmund Kirkheis, in Germany, weighing 3200 lb., is priced in New York, including duty and all carrying charges, at $306. For a similar press made by us, 200 lb. less in weight, our selling price is $327. In other words, our price in New York or Brooklyn is $327, and the German price is $306. There is another case here of a German press, made by the same maker, weighing 8800 lb. The selling price in New York, duty paid, is $661. A similar press made by us, 200 lb. heavier, is priced at $690. These are actual figures.

SENATOR HEYBURN. How much profit have you on one of those machines?

MR. PAGE. Probably 10 per cent. I have here a case of a heavier press, a press weighing 30,000 lb. The German price, including duty, at New York, is $1993. A similar press made by us, weighing 26,000 lb., sells for $2340. In that case our actual cost is $2300, so that there is practically no margin in the price at which it is sold.

SENATOR HEYBURN. Is any quantity of that machinery imported?

MR. PAGE. Not a great deal of it.

SENATOR HEYBURN. Does the tariff keep it out?

MR. PAGE. I think it does.

SENATOR HEYBURN. Would it come in, in your judgment, if the tariff were removed?

MR. PAGE. I think it would. These machines are in the nature of a plain, simple machine that they can build quite as low as we can—quite as low as any manufacturer in America.

SENATOR HEYBURN. You could manufacture in France and import and compete on favorable terms with your own American factories, could you not?

Home Competition Keen

MR. PAGE. I think we can; yes, sir. I might mention, in view of the figures I gave you of this last press, which shows a very small profit to us at the price I mentioned, that competition is very keen in our line of machinery. There are probably half a dozen concerns of the first class in the line, and there is the keenest kind of competition, and it simply holds the price down. I believe, under present conditions, it would make absolutely no difference how high the duty was on our line of machinery, as regards the selling price.

SENATOR HEYBURN. Do you import any of those machines from your foreign factories to this country?

MR. PAGE. Very few, and only of types we do not make here. On the question of patents, I will say that we have no fundamental patents and it is hardly possible to obtain any patents that would give us any protection to speak of against foreign competition in this line.

SENATOR HEYBURN. You started these factories abroad purely to compete in the foreign market?

MR. PAGE. To compete in the foreign market.

SENATOR HEYBURN. Not in this market?

MR. PAGE. No; to hold a business that we initiated during dull times in this country.

SENATOR HEYBURN. If the duty were removed, would you import to this country from your foreign factories?

MR. PAGE. Probably; yes.

SENATOR HEYBURN. And transfer your wage-account from this country to France?

MR. PAGE. There would be several courses that probably would be open to us, none of which we would like to avail ourselves of; but in case of necessity we probably would have to avail ourselves of some of them. One would be the enlargement of our foreign factories and the importing into this country in order to get the benefit of the low rates of labor over there.

I have mentioned the fact of competition being keen. There is absolutely nothing in the nature of a combination, or anything of that kind, in this line. It is individual effort on the part of every concern, and keen competition. The profits are small. We look upon 10 per cent. as a good profit.

SENATOR WILLIAMS. Do you export any of your goods?

MR. PAGE. Yes. But I should like to make it plain that the class of machinery that we ship from this side over there is, in nine cases out of ten, of a very special nature. I will cite a case. We are now shipping into England a large special press machine for kitchen utensil work, for making a big sheet-metal bowl. The method for making that over there at the present time is by means of two machines, two press operations, taking probably five mechanics or press operators to run those two machines, with an intermediate annealing operation between the two machines, making it rather a costly process. We furnish one machine which in one operation will produce that article. That is a new type of machine which we create and design here; and through the fact that we create it and it will reduce the cost of production of that article over there, they pay us a higher price for it than they can buy the two machines for. Now, it is through just such transactions as that that we get some foreign trade.

American Initiative and Foreign Imitation

SENATOR SIMMONS. The sum and substance of that is that you can make that particular machine cheaper here than they can make it there; is it not?

MR. PAGE. No; not the machine. The machine costs more money, but it produces cheaper. It produces the work it is to turn out cheaper. That machine was built to turn out a certain sheet metal article, and it cuts down the cost of the sheet metal article that it produces.

SENATOR MCCUMBER. Then you can sell over there just so long as you can produce a special type of machine in advance of what they have over there?

MR. PAGE. That is exactly the point I am trying to make.

SENATOR MCCUMBER. And as soon as they begin to copy that machine, and make it over there, they will cut off your market?

MR. PAGE. Absolutely.

SENATOR WILLIAMS. I understand the situation to be about this: You initiate, and they imitate. Is that it?

MR. PAGE. That is the idea; yes, sir.

SENATOR WILLIAMS. You can trust Providence for your initiation to last as long as their imitation; can you not?

MR. PAGE. I do not think so.

SENATOR WILLIAMS. You will not quit initiating after you have finished with your present machines?

MR. PAGE. No; but here is the point in connection with that. This machinery that results from this initiating is, after all, a small amount of the total business we do.

SENATOR WILLIAMS. I know, but this is not the only machine of which that is true, is it?

MR. PAGE. No; of course not.

SENATOR WILLIAMS. We are always initiating these new things; are we not?

MR. PAGE. Yes. That is the only way we can keep in the business.

SENATOR WILLIAMS. The point I am getting at is this: If you have improved a machine, and have got a better one for the same purpose, which would result in lessened cost of production of the article which is made, even if the Germans could make the inferior machine and send it in at a less price than you could, people as a rule would prefer the superior machine made in America, even at a higher price; would they not?

MR. PAGE. Quite right; but the great majority of our business is done on what we are speaking of now as inferior machines. They are not inferior in the sense that they have been displaced. These special machines only apply in certain specific cases. Where a man comes with a certain article, like a lamp, we will say, or a watch, or something of that kind, and he wants an improved plant for making that article, we sit down with our engineers, and go through it exhaustively, and we figure out just the most economical way of producing that thing. Those are special cases. The real basis of the business, the real backbone of it, is the simple line of machines. These others are in the nature of leaders.

SENATOR MCCUMBER. You have stated that you will probably continue initiating advanced machinery?

MR. PAGE. Yes.

SENATOR MCCUMBER. Have you any reason to believe that Germany will not continue initiating advanced machinery?

MR. PAGE. Personally, I have a very high regard for the ability of the Germans to not only manufacture cheaply but to initiate the very things that we are doing.

SENATOR MCCUMBER. Have you any reason for believing that because we have advanced in the past, because we have kept in advance in the past of foreign nations in

the manufacture of time saving and reduced cost of production machinery, we will indefinitely continue superior to the other countries in that respect?

MR. PAGE. I do not believe we will, for the reason that Germany has been sending over here for some years engineers, whom we have right in our shops. We use them and they get the full benefit of all our experience that has gone before, which is the basis of the initiating process, and they go back there and use on the other side the knowledge they got here, to compete with us.

German Competition

SENATOR MCCUMBER. With the newer conditions, with Germany coming to the front, with her following everything up carefully upon a scientific basis, with the energy that she is putting into the field in the development of her foreign trade, is it not a fair presumption that we will not long hold our lead as against Germany in the production and manufacture of all kinds of machinery?

MR. PAGE. I think so. I certainly think so.

SENATOR MCCUMBER. And if we should open this market to them freely, so as to give them the great field of American demand, would it not naturally follow that we would accentuate their ability to create the newer machinery that would be adapted to the requirements of this country?

MR. PAGE. I think their ability has already been accentuated. I think they have the ability right now.

SENATOR HEYBURN. I would suggest that the witness put in the record the complete table of comparative wages which he has referred to.

MR. PAGE. I shall be glad to do that. It is as follows:

Average Wage Paid Per Hour, in Cents.

	Brooklyn.	Paris.
Machinists	0.298	0.171
Diemakers	0.362	0.183
Blacksmiths	0.371	0.221
Laborers	0.20	0.11

It will be seen, as above stated, that the cost in this country is almost twice what it is in France and the cost in both Germany and England is practically the same as in France. It will be seen from this how impossible it would be, if the duty were removed, for us to stay in business in this country in the face of foreign competition, which most assuredly would ensue.

The above facts, in addition to the fact that in our line of machinery labor averages 70 per cent. of the total cost of the product, will make it, we believe, perfectly plain as to why we would be unable to compete with foreign makers if the tariff were removed. Notwithstanding the present tariff, German competition is keen at the present time in this country in this line.

There could only be one condition on which we would be able to stay in business, and that is the reduction of wages to the same level as prevails in European countries. We believe it would be a question of paying less for labor or not employing labor at all.

We most strongly recommend, we believe, for the good of the machine tool industry in this country as represented not only by the manufacturer but also by the employee, that the duty on machine tools be left as at the present time.

The 1912 iron ore booklet of E. N. Breitung & Co., Rockefeller Building, Cleveland, has been issued, giving complete analyses of the ores handled by this firm, with guarantees for the coming year. Two Bessemer, 10 non-Bessemer and 5 siliceous ores of the Marquette Range are represented and one Michipicoten ore Algoma Bessemer. The last named is mined by the Breitung Iron Company of Canada. It runs 44.20 per cent. iron, 0.033 per cent. phosphorus and 34.47 per cent. silica.

The Columbia Iron & Steel Company, Portland, Ore., corrects the impression conveyed by a paragraph in *The Iron Age* of December 7, 1911, that the company expects to build a foundry. It is organized for the purpose of erecting a blast furnace and manufacturing pig iron. The company states that it will begin building in the near future, the plant to be located at St. Helens, Ore.

The eighth annual dinner of the Metal Manufacturers' Association, of Philadelphia, Pa., was held February 8 at the Bellevue-Stratford Hotel, with 125 in attendance. President E. L. Langworthy acted as toastmaster. The next quarterly meeting of the association will be held at the Bellevue-Stratford on the evening of March 13.

Machine Tools Wanted for Japan

Rockhill & Vietor, shipping and commission merchants at 114 John Street, New York, have placed in the hands of the local machinery trade a large list of machine tools for export to Japan. Most of the tools are specified. With 17 of the 45 items the products of English or German builders are designated, a total of 30 foreign made tools being called for. The total list calls for 86 tools. It follows:

1.—Universal horizontal drilling, boring, tapping, studding and milling machine.

2.—Horizontal drilling, tapping and studding machine. (Wm. Muir & Company's Sheet No. 904-D.)

3.—One sensitive drilling machine. (Illustrated in Cincinnati Bickford Tool Company's catalogue.)

4.—One sensitive drilling machine, 20-in. sliding head, high speed.

5.—One sensitive drilling machine. (Illustrated in Cincinnati Bickford Tool Company's catalogue.)

6.—One automatic gear hobbing machine. (Illustrated in Schuchardt & Schutte catalogue No. 195, pages 110-111.)

7.—One automatic gear hobbing machine. (Illustrated in Schuchardt & Schutte catalogue No. 195, pages 108-109.)

8.—One automatic gear hobbing machine. (Illustrated in Schuchardt & Schutte catalogue No. 195, pages 112-113.)

9.—One slotting machine. (Illustrated in Manning, Maxwell & Moore catalogue, page 177, figure 11,311.)

10.—Two slotting machines. (Illustrated in Kendal & Gent, Ltd., catalogue, sheet No. 181 H.

11.—Two slotting machines. (Illustrated in Kendal & Gent, Ltd., catalogue, sheet No. 162 H.)

12.—Two slotting machines. (Illustrated in Kendal & Gent, Ltd., catalogue, sheet No. 182 H.)

13.—Two slotting machines. (Illustrated in Kendal & Gent, Ltd., catalogue, sheet No. 182 H.)

14.—One slotting machine. (Illustrated in Kendal & Gent, Ltd., catalogue, sheet No. 185 H.)

15.—One 24-in. engine lathe. (Illustrated in Manning, Maxwell & Moore catalogue, page 337; 11,632.)

16.—Two high-speed sliding surfacing and screw-cutting lathes. (Illustrated in J. E. Reinecker's catalogue, pages 96-97.)

17.—One 24-in. engine lathe. (Illustrated in Manning, Maxwell & Moore catalogue, page 339, figure 11,635, type B.)

18.—Two 32-in. engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 349, figure 11,647.)

19.—One 62-in. triple-geared engine lathe, heavy pattern. (Illustrated in Manning, Maxwell & Moore catalogue, page 365, figure 11,664, motor driven.)

20.—One 76-in. extra heavy triple-geared engine lathe, universal belt and geared feed. (Illustrated in Manning, Maxwell & Moore catalogue, page 366, figure 11,665.)

21.—Two 32-in. swing engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 347, figure 11,645.)

22.—Two 32-in. extra heavy geared head engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 351, figure 11,650.)

23.—Three 20-in. engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 333, figure 11,625.)

24.—Three geared head engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 340, figure 11,597.)

25.—One 22-in. motor-driven engine lathe. (Illustrated in Manning, Maxwell & Moore catalogue, page 334, figure 11,628.)

26.—Two 32-in. double back geared engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 352, figure 11,651.)

27.—Three gap engine lathes. (Illustrated in Manning, Maxwell & Moore catalogue, page 389, figure 11,731.)

28.—Three high-speed cutting gap lathes. (Illustrated in James Archdale & Company's catalogue, 10th edition, pages 98-99.)

29.—One high-speed cutting lathe. (Illustrated in James Archdale & Company's catalogue, 10th edition, pages 96-97.)

30.—Three high-speed cutting lathes. (Illustrated in James Archdale & Company's catalogue, page 19.)

31.—Five sliding surfacing and screw cutting lathes. (Illustrated in James Archdale & Company's catalogue, 10th edition, pages 106-107-112.)

32.—One break lathe. (Illustrated in Kendal & Gent's catalogue, sheet No. 295 H.)

33.—One universal relieving lathe. (Illustrated in J. E. Reinecker's catalogue, pages 156 to 159, 1908.)

34.—One plain grinding machine. (Illustrated in Manning, Maxwell & Moore catalogue, page 833, figures 12,882-12,883.)

35.—One plain grinding machine. (Illustrated in Manning, Maxwell & Moore catalogue, pages 832, figures 12,880-12,881.)

36.—Two planing machines. (Illustrated in Cincinnati Planer Company's catalogue, page 39.)

37.—Two planing machines. (Illustrated in Cincinnati Planer Company's catalogue, page 13.)

38.—Ten vertical milling machines. (Illustrated in Cincinnati Milling Machine Company's catalogue, pages 78-79.)

39.—One vertical milling machine. (Illustrated in Alfred Herbert, Ltd., catalogue, pages 42-48, 1905.)

40.—Four vertical Milling machines. (Illustrated in Cincinnati Milling Machine Company's catalogue, pages 82-83.)

41.—Two universal milling machines. (Illustrated in Cincinnati Milling Machine Company's catalogue, pages 70-71.)

42.—Three universal milling machines. (Illustrated in Manning, Maxwell & Moore catalogue, page 250, figure 11,456.)

44.—One horizontal milling machine. (Illustrated in Manning, Maxwell & Moore catalogue, pages 270-272, figure 11,503.)

45.—Three No. 3 horizontal milling machines. (Illustrated in Manning, Maxwell & Moore catalogue, pages 270-271, figure 11,500.)

The City Council of Port Arthur, Ontario, Canada, and the Atikokan Iron Company have reached an agreement whereby the company will locate in that city a steel plant involving an investment of $5,000,000, contingent upon the Government renewing the iron bounties. It is estimated that there is already proved in the district between Sudbury and Manitoba enough iron ore to last Canada 100 years, but it is not profitable to develop it without Government assistance.

The Machinery Markets

Conditions have been quiet or tending that way in the machinery trade in practically every part of the East during the last week. Small lot buying continues to be the support of both dealers and manufacturers. At Cleveland, in the South and on the Pacific coast there has been noteworthy improvement. New York trade has been fair, with little or no business from the railroads, manufacturing concerns contributing the activity. In Cleveland the demand for machine tools was the best of many weeks, the demand coming from scattered sources and largely for single tools. That city also has some new inquiries of importance. Cincinnati has an increased number of inquiries but sales are slow. Detroit business has been below normal so far this month, although builders of special machinery are doing fairly well. The New England market is uneventful. In Philadelphia small lot buying continues a feature, with automobile demands in prospect. The South is responding favorably to the influence of better weather. In St. Louis a steady run of single tool orders continues. On the Pacific coast trade continues to improve and some fair sized deals are being figured on. Wood working machinery is in good demand on the coast and the requirements of equipment by contractors in connection with the building of the Panama-Pacific Exposition are anticipated.

New York

NEW YORK, February 21, 1912.

Actual transactions in the New York machinery market have been sufficiently plentiful in the last week to permit of conditions being described as "fair." There continues to be a considerable number of inquiries on which action has been delayed by purchasing agents, although the week has brought the closing of a part of such business. Orders written have almost without exception been for one or a few tools so far as domestic business is concerned. One or two firms have received excellent orders from abroad, and for these the export trade has helped to make February an exceptionally good month. No substantial orders have been placed against the list of the Delaware & Hudson Railroad, issued the first of the year for its Watervliet shops, and in the case of one or two manufacturing concerns no buying has been done, although lists are out or awaited. It is reported that the General Electric Company, Schenectary, N. Y., is in the market for a few tools. The feeling of the trade is far easier than it was a week ago with regard to the proposed new tariff act which provides for the placing of machine tools on the free list. The first installment of testimony and argument by Fred A. Geier before the Finance Committee of the Senate on February 13, and which appeared in last week's issue of *The Iron Age*, has been digested by machinery men everywhere and they feel more assured that the justice of their cause will be recognized by Congress.

D. Ullman's Sons, Buffalo, N. Y., have purchased a site on Metcalf street and the West Shore Division of the New York Central Railroad and will erect thereon a warehouse and small smelting plant for reclaiming refuse metals, etc.

The Interurban Electric Light & Power Company, Buffalo, has been incorporated to do business in Kenmore and Tonawanda. Plans are being prepared for the erection and equipment of a powerhouse. The directors are Alexander G. Hoefler, 296 Connecticut street, Frank W. Tracy and Albert Dodge.

The four-story brick factory of the Bingham Trunk Company, Mechanic street, Buffalo, was destroyed by fire February 12 and the machinery and equipment badly damaged, with a loss of $30,000. The plant will be rebuilt at once.

The Niagara Silk Mills, Tonawanda, N. Y., is having plans prepared for an addition to be made to the company's plant early this spring.

The Duoform Company, North Java, N. Y., has been incorporated to manufacture medicines, flavoring extracts, toilet articles, etc. S. A. & M. C. Brooks and J. Keenan are the incorporators and the capital stock $50,000. Arrangements for a factory are being completed.

The Jas. B. Lyon Printing Company, Albany, N. Y., has plans completed for a four-story and basement factory building, 50 x 60 ft., to be erected at 8-12 Daniel street.

The Wayne Dye Works, Little Falls, N. Y., recently incorporated with a capital stock of $50,000, will erect and equip a dye works for commission skein silk dyeing for the knitting and weaving trades. Peter Cox, President.

Catalogues Wanted

The Chamber of Commerce, Uniontown, Pa., is investigating the Tungsten cluster system of street lighting and desires catalogues, literature and other information from manufacturers of ornamental street lighting posts.

New England

BOSTON, MASS., February 20, 1912.

The market is uneventful. A few small lists are being figured and some promising inquiries are received, but actual sales are small. The dealers find that Connecticut is their best market, and probably the widely diversified metal industries of that State are the best buyers in the country at this time, with the possible exception of centers where the automobile manufacturing business is concentrated.

Brown, Wales & Co., Boston, dealers in steel and in metal specialties, will remove their headquarters from Purchase street to a building now in process of erection at C and Fargo streets, South Boston. A half of the eight-story structure will be occupied, providing needed increased floor space. A railroad siding will facilitate the handling of materials. Removal will be made in the spring.

The Vermont Machine Tool Company, Windsor, Vt., has been incorporated to manufacture a multiple spindle automatic turret drilling machine designed by George O. Gridley of the Windsor Machine Company, whose automatic machinery is known everywhere that metal is worked. The new machine has in addition to the advantages of the usual type of multiple spindle drilling machines a complete automatic action, so that its output is not dependent upon the personal element of the operator. At the same time it has certain features in common with turret machinery.

The Geometric Tool Company, Westville, New Haven, Conn., has awarded the contract for a large addition to its works, consisting of a building two and three stories, 50 x 182 ft., of brick, mill construction.

The L. F. Dettenborn Woodworking Company, Hartford, Conn., has awarded the contract for a woodworking mill, 57 x 152 ft., two stories and basement, and a boiler house and kiln dry room, 36 x 42 ft., one story.

The Pratt & Cady Company, Hartford, Conn., manufacturer of hydrants, valves and fittings will increase its capital stock from $400,000 to $500,000, the new capital to be used for the enlargement of the plant. Just what departments will be increased will not be determined until a little later. The recent growth of the business has been so great that the company finds it necessary to increase its manufacturing equipment.

The large patent leather shop of W. C. Welch & Co., Woburn, Mass., was burned February 11 with a loss of $85,000.

The Moore Drop Forging Company, Springfield, Mass., will erect a brick addition to its plant, of heavy mill construction, one story, which will give 10,000 sq. ft. of additional floor space. The building will be given up to the company's wrench manufacturing department. None of the machinery and other equipment has been purchased.

The Stamford Foundry Company, Stamford, Conn., manufacturer of stoves, ranges and furnaces, states that it does not contemplate enlarging its works at the present time. Of the new capital recently authorized only a small part will be issued at present.

The American Silver Company, Bristol, Conn., states that it will require no new equipment for the addition to be made to the plating room. The new plating tanks will be built in the company's factory. The addition will be 36 x 50 ft., two stories.

The Cushman Chuck Company, Hartford, Conn., manufacturer of lathe and drill chucks, will remove its New York office from 18 Dey street to 38 Vesey street March 1.

The main offices of the Ansonia Brass & Copper Company, Ansonia, Conn., will shortly be removed from New York to Ansonia where a remodeled building will be occupied. This company is a subsidiary of the American Brass Company.

The Colton Mfg. Company, Montpellier, Vt., manufacturer of saddlery hardware, has reorganized its selling force and has tentative plans for increasing its works, but nothing has been decided as to the immediate future.

At the annual meeting of the stockholders of Landers, Frary & Clark, New Britain, Conn., some important changes were made in the board of officers. Frederick G. Platt was made a director to succeed Henry E. Russell, New London, Conn., and Frederick A. Searle and Arthur G. Kimball were added to the board. The remaining directors are Charles F. Smith, George M. Landers, Francis R. Cooley, Hartford; Harris Whittemore, Naugatuck; Andrew J. Sloper, Lucius A. Barbour, Hartford; Henry C. Judd, Hartford; Alfred A. Pope, Hartford. Charles F. Smith was elected president and treasurer; Frederick A. Searle, A. G. Kimball and Joseph F. Lamb, vice-presidents; A. W. Kempton and James N. Stanley, assistant treasurers, and Miss M. A. Parsons, secretary. George M. Landers resigned the offices of secretary and treasurer to assume an active part in the management of the North & Judd Mfg. Company. President Smith assumes the additional office of treasurer. Miss Parsons, who takes the secretaryship, has been employed as confidential secretary for a number of years.

The B. F. Sturtevant Company, Hyde Park, Mass., has developed a line of gasoline engines. An aeroplane motor is of the stationary type and has given excellent results through a long series of tests. The company is also bringing out in this connection a line of small unit direct connected electric generating sets.

Philadelphia

PHILADELPHIA, PA., February 20, 1912.

Small lot buying continues to characterize transactions in machinery and tools in the local market and the bulk of the business under negotiation is of the same general character. An order for four small lathes is the largest single sale reported in a canvass of a number of the merchant trade. Several fair propositions are shaping themselves, one in particular being the requirements of the Ottomobile Company for its new plant at Mount Holly, N. J. Several plant extensions are also either under way or being contemplated which are expected to result in considerable purchases of machinery a little later on.

Some of the builders of special equipment report slightly better conditions, but plant operations are still very irregular—one department may be busy while others continue comparatively dull. Railroad demand originating in this territory is very light, although some inquiry is reported from Southern roads. A fair inquiry for power equipment is noted, confined mostly to small capacities. A moderate business in second hand machinery is reported, although far below what might be considered normal.

Herman L. Winterer has purchased the entire equipment of the Salmon Iron Works, Freeland, Pa., including both foundry and machine shop equipment, which will be overhauled and offered for sale.

The factory building of Hensel & Colladay, Franklin and Vine streets, which was recently destroyed by fire, will be rebuilt as soon as plans now under way can be completed. The Wm. Steele & Sons Company is preparing the plans. The building will probably be of concrete construction.

A buyer is in the market for a 75-kw. direct connected engine and generator, 125 volt, direct current, about 250 r.p.m. Offers can be submitted care Box 302, *The Iron Age*, Real Estate Trust Building, Philadelphia.

The J. W. Paxson Company reports business in foundry supplies as rather quiet. It has installed a complete sand blast tumbling barrel outfit in the new malleable iron foundry of the Chisholm & Moore Mfg. Company, Cleveland, Ohio.

Several local contractors have been figuring on proposals for the erection of a new foundry building to be erected in Washington, D. C., at the United States Navy Yard, also for a new forming plant to be built at Fort Mifflin, near this city, for the Government.

The American Poured Concrete Steel Molds Corporation has been incorporated under Delaware laws with a capital stock of $50,000. Ralph Hoder, M. W. Guernsey and David Landau, all of Scranton, Pa., are named as incorporators.

The Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., reports considerable business in Aldrich pumps, six of which, of considerable size, have been shipped during the past two months. Its machine shop is particularly busy, but the steel foundry department is quiet. A fair volume of business is coming to its gray iron foundry, including some heavy bridge base work. A fair volume of general inquiry is reported.

The Link-Belt Company, Nicetown, has filed plans for a structural steel storage building, 70 x 160 ft., covered with galvanized iron. It reports quiet business conditions, although the outlook for the future is considered more favorable.

The Ajax Metal Company, Richmond and Allen streets, has purchased a site of 25 acres, fronting on the Delaware River at Orthodox and Richmond streets, on which it will erect a new plant. It is proposed to begin work the coming spring.

The city of Chester, Pa., is planning to build a large modern pier at the foot of Reaney street. The matter will come before the Commissioners of Navigation for the Delaware River at an early date. The proposed pier will be 203 x 529 ft. long and is to be built of steel and concrete.

Work has been started by the William Steele & Sons Company on the new plant of Isaac A. Sheppard & Co., stove manufacturers, at Erie avenue and Sepviva streets. Two buildings are to be erected at this time, including a three-story manufacturing building 82 x 242 ft., and a one-story foundry building 107 x 345 ft. Electricity will be used for general power purposes, the boilers, engines and generators having already been provided for. Considerable general machinery will be required, but will not be considered for some time.

General Manager Thompson of the Baltimore & Ohio Railroad, in an address to the railroad men and citizens of Cumberland at the Railroad Young Men's Christian Association in South Cumberland, Md., February 4, said he had received authority to erect in South Cumberland new shops at a cost of between $3,000,000 and $4,000,000; that the plans have already been made, and that work will be started in the spring.

The Northampton School Board, Northampton, Pa., will receive bids February 29 for one boiler to be installed in the Washington school building, Northampton.

The plant of the Link Machinery Company, Williamsport, Pa., was recently destroyed by fire.

Chicago

CHICAGO, ILL., February 20, 1912.

Elk City, Neb., will receive bids until March 1 through W. E. King, engineer, Omaha, for the construction of a power plant.

The city of Charleston, Ill., has granted a 50-year franchise to the Central Illinois Public Company, which will construct and equip a light plant at that point.

The Illinois Trunk & Mfg. Company, Springfield, Ill., has increased its capital stock from $10,000 to $25,000 for the purpose of increasing its manufacturing mechanical equipment.

The Jacksonville Gas & Electric Company, Jacksonville, Ill., has been incorporated by H. E. Chubbuck, F. G. Buffe and E. W. Fowler to establish a public service company as a subsidiary of the McKinley System.

The Utica Elevator Company, North Utica, Ill., has been organized with $12,000 capital stock by George M. Reynolds, A. C. Wylie and A. O. Esmond to equip a grain elevator at that point.

The St. Louis Iron Store Company has increased its capital from $50,000 to $70,000 in order to increase its business and equipment.

The D. Rixman Lumber Company, Hoyleton, Ill., has been organized with $60,000 capital stock by Fred. E., William C. and D. Rixman for the purpose of establishing and equipping a saw mill, planing and general wood-working plant.

The Illinois Silo Company, Bloomington, Ill., has been incorporated with $100,000 capital stock by W.

H. Boyer, Charles I. Will, C. C. Bowman and G. C. Heberling for the manufacture of metallic silos.

The National Coal Mining Company, Farmington, Ill., has been incorporated with $50,000 capital stock by C. D. North, Hugh Sloan and L. D. Fletcher and is in the market for coal mining equipment.

The J. B. Kreikemeier Coal Company, De Soto, Ill., with $100,000 capital stock, has been organized and incorporated by J. B. Kreikemeier, C. B. Williams and H. J. Walters to equip and operate coal mine property owned by the stockholders.

The City Council of Altamont, Ill., will receive bids for the construction of a waterworks system, including pumps, tower, tank, hydrants, valves, etc.

The Beatrice Metal Culvert Works, Beatrice, Neb., recently mentioned as having been incorporated with $30,000 capital stock, has leased quarters and is in the market for machinery, stock and equipment for the manufacture of road culverts, tanks and sheet metal products.

The Harley-Davidson Motor Company, Milwaukee, Wis., has had plans prepared for an addition, 130 x 180 ft., five stories and basement. The building with the equipment will cost $115,000.

Cleveland

CLEVELAND, OHIO, February 20, 1912.

The demand for machine tools during the week was better than it has been for some time. Dealers did a fair volume of business in single tools and small lots, orders coming from scattered sources and being well distributed between the different lines of standard tools. The largest sale reported was a lot of tools aggregating about $5,000 for shipment outside of the state. Considerable new inquiry came out for small lots of tools. The largest is from a northern Ohio manufacturer who wants about $15,000 worth of machinery. This lot includes two lathes, two shapers, two drills and two grinders. Several recent inquiries for lots of tools ranging around $10,000 each are still pending, and it is expected that some of this business will be placed shortly. A large amount of second-hand machinery is being thrown on the local market because of the closing of some small shops that have been enlarged for repair work.

As indicating the general improvement in conditions an interesting statement is made by one of the leading crane builders in northern Ohio. This is to the effect that this company now has orders on its books for cranes and steel plant equipment aggregating 75 per cent. of the total volume of its business in 1911.

At the February meeting of the Cleveland Metal Trades Superintendents and Foremen's Club February 17 J. V. Emmons, chief chemist of the Cleveland Twist Drill Company, delivered an interesting illustrated lecture on the Structure and Heat Treatment of Tool Steel. The social affair of the club for the season will be a dance and card party to be given at the Pythian Castle February 24.

The Westlake Machine Company, Toledo, Ohio, will shortly build a large addition to its plant and commence the manufacture of machines for automatically blowing glass articles of various kinds. The company has been operating a small plant for some time in experimental work. It has just increased its capital stock from $200,000 to $1,500,000. E. D. Libby is president and E. J. Marshall secretary and treasurer.

The Canton-Hughes Pump Company, Wooster, Ohio, is preparing plans for a large addition to its plant, on which work will be started in the spring. The new structure will be used for foundry purposes.

The Smith Lithographic Company, Toledo, Ohio, will shortly begin the erection of a large plant on the West Side of Summit street in that city. The new building will be of steel construction 100 x 135 ft.

A portion of the plant of the Transue & Williams Company, Alliance, Ohio, was burned February 11 and some of the machinery was badly damaged. It is not expected that the fire will seriously interfere with the operation of the plant. The burned portion will be rebuilt at once.

The Comstock-Wellman Bronze Company, Cleveland, Ohio, has changed its name to the Wellman Bronze Company. At a recent meeting of the directors S. T. Wellman was elected president, F. S. Wellman, vice-president and treasurer, and H. G. Wellman, secretary.

The Mansfield Tire & Rubber Company, Mansfield, Ohio, has been organized with a capital stock of $300,000 to take over the plant of the Mansfield Rubber Company. The plant will be under the management of George W. Henner.

The Western Ohio Railroad Company is planning an expenditure of $50,000 to enlarge its power plant at St. Marys, Ohio. It is stated that new generators will be installed increasing the capacity of the plant from 3500 to 6500 kw.

A plant for the manufacture of car heaters will be established in Dayton, Ohio, by W. L. Blackwell of the Dayton Welding Company, who was formerly identified with the Cooper Heater Company.

A new plant is planned for New Philadelphia, Ohio, for the manufacture of gas and electric sad irons and vacuum cleaners. The promoters of the company are W. J. Wise of New Philadelphia, formerly connected with the Dover Mfg. Company, and H. G. Harrold of Canal Dover. The formation of a company with a capital stock of $30,000 is proposed.

Plans for a new electric lighting plant for Salem, Ohio, are being proposed by the Bailey Engineering Company, Alliance, Ohio. Bids will be asked for shortly.

It is announced that the plant of the Troy Foundry Company, Troy, Ohio, which was recently burned, will be rebuilt.

It is reported from Akron, Ohio, that the Diamond Rubber Company of that city will build another large addition to its plant.

The Doylestown Aluminum Ware Company, Doylestown, Ohio, has increased its capital stock from $10,000 to $25,000.

The Director of Public Service, Cleveland, will receive bids March 1 for elevators for the new West Side market house.

Cincinnati

CINCINNATI, OHIO, February 20, 1912.

No appreciable change in the machine tool situation can be reported. Business is somewhat spotty, and while it is generally dull, a few firms state that the inquiries received from the domestic trade are more numerous, and also that the export orders are coming in at a more satisfactory rate.

Factory construction has been almost at a standstill lately, but there are rumors circulating that a revival will be experienced early in the spring season. The foundries continue operating to about 60 per cent. of capacity, although there are a few exceptions on both sides of this estimate.

J. M. Manley, civic secretary of the Cincinnati Business Men's Club, made an address before the Chamber of Commerce, Hamilton, Ohio, February 15, on the subject of "Industrial Education." A large number of the Hamilton Chamber of Commerce members are manufacturers who are interested in seeing the same plan of industrial education, as taught in the Cincinnati schools, introduced in the Hamilton schools. A special committee was appointed to follow up the matter.

Manufacturers in the metal industry of Cincinnati have generally joined in a petition to their representatives in Congress, and to their senators, to use their best efforts to prevent action on the eight-hour bill until they have had an opportunity to be heard.

It is reported that the large reduction plant of the N. Rassel Sons Company, Toledo, Ohio, will be rebuilt. The plant was destroyed by fire January 28. Wallace Gibbons, of Cincinnati, is one of the principal stockholders.

Work will soon be commenced on the large addition to the plant of the Alvey-Ferguson Company, at Oakley, a Cincinnati suburb, which was recently mentioned. The Allyn Engineering Company, Second National Bank Building, is the architect and engineer in charge.

It is stated that the Troy Foundry Company, Troy, Ohio, has completed plans for an extensive adddition to its plant.

The Window Sash Company, of Beaver, Pa., has decided to locate its plant in Wellsville, Ohio. Nothing is known as to the machinery requirements of the new company.

To sell machinery of all kinds the Brockett-Gorham Company, Marion, Ohio, has been incorporated with $25,000 capital stock. Don E. J. Brockett and S. K. Gorham are named among the incorporators.

The Factory Power Company, furnishing power, heat and light to the many machine tool plants at Oakley, a Cincinnati suburb, has increased its capital stock from $100,000 to $200,000. It is understood that no immediate extensions will be made to the company's present plant.

The Columbus Auto Brass Company, Columbus, Ohio, was partly destroyed by fire February 14.

J. H. Cole & Co., South Bend, Ind., have the contract for erecting a waterworks plant at Fort Branch, Ind.

Indianapolis

INDIANAPOLIS, IND., February 20, 1912.

The N. S. W. Motors Company, Indianapolis, has been incorporated with $60,000 capital stock to manufacture engines and auto parts. The directors are Charles Nesom, F. W. Wellman and Louis Sagalowsky.

The DeTamble Motor Company, Anderson, Ind., has been reorganized, the capital stock being increased to $200,000. James W. Sansberry, president of the National Exchange Bank, has been elected president, and Charles H. Walters, who has been secretary-treasurer, will become general superintendent.

The Sibley Machine Tool Company, South Bend, Ind., has increased its capital stock from $70,000 to $82,500.

J. N. Trout, city clerk, Hartford City, Ind., will receive bids to March 7 for furnishing and installing two 100-h.p. steam boilers in the city waterworks.

The Ft. Branch Water, Light, Power & Heat Company, Ft. Branch, Ind., has been incorporated with $25,000 capital stock to supply heat, light and power. The directors are S. R. Lockwood, W. L. Walters and J. E. Toops.

The Marion Iron & Brass Bed Company, Marion, Ind., has changed its name to the Harwood-Bailey Mfg. Company.

The Reeves Pulley Company, Columbus, Ind., is taking on additional employes to bring the work within daylight hours. Business has been growing and some of the departments have been operating until 9 o'clock p. m. The increased business is mainly in the gasoline engine department, on a new model for farms and dwellings.

The Owensville Light, Power & Heat Company has been incorporated at Owensville, Ind., with $25,000 capital stock to supply heat, light and power. The directors are C. B. Smith, J. B. Beresford and G. R. Welborn.

The Vincennes Furniture Mfg. Company, Vincennes, Ind., has increased its capital stock from $25,000 to $50,000.

The Rushville Furniture Company, Rushville, Ind., has increased its capital stock to $75,000.

Detroit

DETROIT, MICH., February 20, 1912.

The volume of business so far this month has been considerably below normal and it seems probable that the totals will not equal those of January. The past few days have been noticeably quiet and sales have been almost entirely confined to single tools. Inquiries are rather slack and are featureless. Beyond a few tools for replacement the automobile makers are doing no buying at present. The Ford Motor Company will be in the market soon for a lot of metal working tools for installation in the additions recently completed at its Highland Park plant and the Continental Motor Company is expected to be a heavy purchaser of equipment in the near future. The amount of the latter company's purchases depends somewhat on whether the tools from its Muskegon plant are removed to this city—a point which is undecided at present. Builders of special equipment are in somewhat better shape and report a fair volume of orders. There is a dearth of new enterprises in the Detroit district and the demand for general shop equipment is inactive.

Builders and architects unite in predicting a building boom for this city this year and state that contracts already assured and new work contemplated presage an extremely busy building season. Contracts awarded for additions to manufacturing plants include the following: Sherwood Brass Works, foundry building; Calvert Lithographing Company, two-story addition; Fisher Body Company, four-story addition; American Wood-Grain Company, three-story addition.

Michigan manufacturers have been seriously inconvenienced this month through coal shortages, a large number of plants have been running on short time and in some of the smaller towns factories have been shut down entirely.

The King Motor Car Company has acquired the plant now occupied by the Hupp Motor Company, at Jefferson and Concord avenues, which will be left vacant when the Hupp Company removes to Mt. Elliott and Milwaukee avenues. The plant comprises four large buildings with a floor space of about 70,000 sq. ft. and will give the King Company manufacturing facilities commensurate with the growth of its business.

The Automobile Forgings Company has been incorporated with a capital stock of $10,000 and will engage in the manufacture of lamp brackets, top irons and special automobile forgings. A factory 30 x 100 ft. at 30 Richmond avenue has been secured and the equipment is now being installed. George W. Strelinger and David E. Vandeneer, formerly of the Rands Mfg. Company, are at the head of the new company.

John A. Peters, sausage manufacturer, is having plans prepared for a $10,000 addition to his plant and will soon give consideration to the purchase of motor driven refrigerating machinery and an electric elevator which are to be installed.

Smith, Hinchman & Grylls are taking figures on a one-story factory to be erected for the Hygeia Filter Company, maker of water filters. The building will cost about $10,000.

The American Agricultural Chemical Company has taken out a permit for the erection of a one-story steel power house to be located at Carbon and Foreman streets. The new structure will cost $35,000.

The Interchangeable Fixtures Company, Grand Rapids, Mich., has been reorganized and plans for an extensive addition to the present factory are being considered. James S. Fisher is president.

The Ross Cabinet Company has been organized at Otsego, Mich., with a capital stock of $50,000 for the manufacture of a patent filing cabinet. The stockholders include George E. Bardeen, George R. Ross and Charles W. Edsall.

The Babcock Tissue Paper Company, Otsego, Mich., has increased its capital stock $75,000. Considerable enlargement of the company's activities will follow.

P. M. Wege, of Marietta, Ohio, and associates have acquired a site of two and one-half acres in Grand Rapids, Mich., for the establishment of a plant for the manufacture of metal furniture. Plans for the buildings are now being drafted and it is intended to begin construction March 1.

The Jackson Gas Company, Jackson, Mich., is planning the installation of a water gas machine with a capacity of 1,000,000 ft.

The Michigan Shade Roller Company, Bay City, Mich., has been organized with $20,000 capital stock to manufacture shade rollers. The directors are C. C. Schulte, E. C. Hartz and Charles Stevenson.

Through the efforts of the Chamber of Commerce, Grand Rapids, Mich., a new automobile plant is assured for that city. A guarantee of $100,000 has been raised and a site for the new plant is now being negotiated for. The Decatur Motor Truck Company, now located at Decatur, Ind., is the concern involved.

It is reported that William W. Vaughn & Co., Detroit, will establish a large canning plant at Essexville, Mich.

The plant of the South Side Mfg. Company, Traverse City, Mich., was destroyed by fire the past week, entailing a loss of $40,000. The company was a manufacturer of finished lumber, box shooks, etc., and W. W. Parr is manager.

The Industrial Works, Bay City, Mich., manufacturer of machinery, locomotive cranes, etc., has had plans prepared for a number of new buildings including a machine shop and erecting room 150 x 525 ft., a car shop 150 x 300 ft., a storage building 60 x 300 ft. and large additions to the boiler and blacksmith shops. The new buildings would double the capacity of the present plant. The improvements are conditional on the closing of a street adjacent to the company's property, to which the city will undoubtedly agree, as employment will be furnished for 1000 more men. The company is at present completing an extensive addition to its steel castings plant.

The Lutes-Sinclair Company is a new corporation at Benton Harbor, Mich., which has been organized with $500,000 capital stock to manufacture laundry and other special machinery.

The German-American Sugar Company, Bay City, Mich., is making a number of improvements to its plant, including the enlarging of the boiler house and the installation of equipment for molasses reduction in an addition to the main factory building.

The American Seating Company, Grand Rapids, Mich., maker of school furniture, has awarded contracts for the erection of three new one-story buildings of brick construction, each 40 x 100 ft.

The South

LOUISVILLE, KY., February 20, 1912.

The period of zero weather which extended over most of the South for six or eight weeks came to an end recently, and the statement that business has slumped because of unseasonable weather conditions was borne out by the improvement which immediately put in an appearance. Manufacturers and dealers report that there is now an excellent demand for machinery, and that inquiries which have been in the market for months are materializing in the shape of orders. The outlook is for continued good business, and most of those in the trade expect to enter this spring season with a large amount of business on their books. Electrical apparatus continues in good demand, with other power equipment selling well. Ice machinery is in better demand.

Fitzpatrick & Hoepfner, Columbus, Ohio, who have the contract for the equipment of the Louisville hospital plant, have announced some of those who will furnish the machinery. The Henry Vogt Machine Company, Louisville, was given the contract for the boiler plant and refrigerating system, the boilers aggregating 600 h.p.; the James Clark, Jr., Electric Company, Louisville, will furnish the alternators, exciters and motors, which are 10 in number and of special design; and the three engines, each of 185 h.p. capacity, will be of Ridgway manufacture, the sale of the latter having been handled by J. Hoadley Cochran, the company's local representative. The machinery contracts have yet to be approved by the city hospital commission, but it is certain that approval will be given.

E. D. Morton & Co., Louisville, reports the sale of a Rockford drill press to J. Schwarzwalder & Co., Louisville, and a shaper of the American Machine Tool Company, Cincinnati, to the Louisville Railway Company.

The Louisville office of Fairbanks-Morse & Co. has sold the motor installation for the new plant of the Louisville Planing Mill & Hardwood Flooring Company, which is now being erected. A number of other local wood-working plants will install electric power facilities in the near future.

The Kentucky Gear & Machine Company, Louisville, reports a good demand from structural iron manufacturers for its patented cut-off saw. The company has plans for considerable enlargements of its plant in view, but these have not yet been definitely formulated.

The Kentucky Check Row Corn Planter Company, Bowling Green, Ky., will begin manufacturing operations in the near future. The machine is a patented agricultural implement.

Newton D. Holbrook, formerly manager of the plant of the Pope-Hartford Automobile Company, has been appointed superintendent of the motor car department of the Ames Motor Company, Owensboro, Ky.

A. C. Barrow and T. Stanley Clay, Winchester, Ky., are considering equipping a shop for automobile repair work.

The Bowling Green, Ky., Gaslight Company is enlarging its power-plant, a contract for a 500-h.p. boiler having been let. Other improvements in the plant are to be made in the immediate future.

The Lexington Tobacco Hogshead Company, Lexington, Ky., has increased its capital stock from $10,000 to $20,000, and will enlarge the capacity of its plant. W. L. Spears is secretary and treasurer.

Seth Curlin, Union City, Tenn., is considering establishing a plant for the manufacture of water-proof materials at Hickman, Ky.

The Berryman Realty Company, Lexington, Ky., has been incorporated with $120,000 capital stock, the erection of an ice factory being one of its projects. C. H. Berryman is manager of the company.

James Davis and R. L. Russell, Campbellsville, Ky., are surveying a water-power site on Robinson Creek, near that city, and will erect a plant if the survey indicates that the project is feasible.

An electric haulage plant is to be installed at once in the mines of the Kentucky Midland Coal Company, Central City, Ky. Cutting machines and other equipment will be installed. The company plans to increase the daily output to 2000 tons. W. L. Gordon, Jr., is manager of the company.

Henry Segraves, Pikeville, Ky., is erecting a foundry and machine shop at that point. Equipment for the plant is now being purchased.

The sale of $23,000 of bonds by the city of Murray, Ky., will be provided for at once in order to secure funds for the erection of a water-works system.

The Board of Education, Louisville, is in the market for considerable equipment for the machine shop and forge department of the Manual Training High School. Sam D. Jones, business director, will make the purchases.

Charles Ralston, secretary and treasurer of the Stony Fork Coal Company, Middlesboro, Ky., has been made selling agent for the automatic bituminous coal jig of the Tamaqua, Pa., Mfg. Company, and will have charge of sales to mines in Southern territory. He is installing a coal washer at the plant of the Red Ash Coal Company, Caryville, Tenn.

The mill of the John A. Rowe Cut Stone Company, Bedford, Ind., which was destroyed by fire February 7, is to be rebuilt at once. The loss was in the neighborhood of $30,000.

The Empire Chair Company, Elizabethtown, Tenn., will erect an addition to its factory.

The Alamo Light & Power Company, Alamo, Tenn., has been given a franchise for the construction and operation of an electric light plant.

The Duck River Power Company, Shelbyville, Tenn., has increased its capital stock from $35,000 to $100,000.

The city of Johnson City, Tenn., has awarded contracts for the construction of its water system, F. R. Stone & Co., Oklahoma City, Okla., being given the contract for a 13-mile pipe line to cost $42,215.

The Nyberg Automobile Works, Chattanooga, Tenn., recently incorporated with $100,000 capital stock, is to erect its own factory building at once, and is meanwhile using a leased building. Motor cors will be turned out in large quantity.

The Lexington Foundry & Machine Company, Lexington, Tenn., recently incorporated with $10,000 capital stock, has taken over the plant of the Lexington Machine Works and will enlarge it considerably.

Pulaski, Tenn., is to erect a new electric light plant, and specifications are being sent out by the City Council.

The Allen Mfg. Company, Nashville, Tenn., which makes stoves and ranges, is preparing to move its plant. Whether it will continue in Nashville or move to some other city has not been decided.

The Nashville Machine Company, Nashville, Tenn., has been given the contract for the reconstruction of the municipal electric light plant of Springfield, Tenn. The company reports that its brass foundry is being enlarged.

C. A. Devine and others, Bishopville, S. C., plan the erection of a plant for the manufacture of metal signs.

The Grandin Lumber Company will erect two bandmills and a planing mill at Lenoir, N. C.

The High Point, N. C., Motor Company is in the market for machine shop equipment, including a lathe, drill press, etc. George Wilson is manager of the company.

The Palmetto Iron Works, Greenville, N. C., will erect a foundry. The building will be 40 x 117 ft., of brick.

The Eagle Mfg. Company, Liberty, N. C., has been organized with $25,000 capital stock for the manufacture of metal washboards. J. H. Johnson is secretary-treasurer of the company.

St. Louis

ST. LOUIS, MO., February 19, 1912.

There is a very comfortable and steady run of single tool business as well as some demand for second hand machinery which is enabling dealers to keep up their optimism. At the same time there is a feeling that there will be no spurt in business until after the political turmoil is well out of the way, approximately a year hence.

The Non-Royalty Shoe Company, St. Louis, has been incorporated with $100,000 capital stock. The company, financed by Western shoe manufacturers, is for the sole purpose of testing the economy and availability of any and all types of shoe manufacturing machinery which is not controlled by the United Shoe Machinery Corporation, now under Federal investigation. American and foreign machinery will be tested and reports made to the manufacturers for their consideration in re-equipping their plants.

The Mountain Ice Company, St. Louis, with $300,000 capital stock, has been incorporated by P. D. C. Ball, Dan Murphy, W. E. Keller, L. B. Von Weise, E. R. Bladgen, James P. Ball and S. Swarts to build and equip a large ice manufacturing plant at Argenta, Ark., an icing station on the Iron Mountain Railroad. It will have a capacity of 150 tons per day.

The Railway Devices Company, St. Louis, has been incorporated with $50,000 capital stock by Louis A.

Hoerr, John Kiburg and C. E. Chaffee to equip a plant for the manufacture of devices used in the construction and repair of railway locomotives.

The Short Creek Mining Company, Joplin, Mo., has been organized by Frank and Lee Childress and J. W. Von Borris with $15,000 capital stock and will equip a mining plant at once.

The Winter-Langeneckert Company, St. Louis, has taken out a permit for the construction of a new factory building which will be equipped with machinery to increase the company's output.

Capitalists represented by the engineering firm of Holman & Laird, St. Louis, have completed their plans for building and equipping a water-power electric plant at Cotter, Ark., and have applied to Congress for final permission to dam the White River at that point.

The Bernet, Kraft & Kauffman Milling Company, St. Louis, has plans for the construction and equipment of a plant for the mechanical bleaching and blending of flours.

The County Court, at Paris, Monroe County, Mo., will receive bids until noon February 28 for a heating plant, complete, for the county courthouse building. M. K. Curtright, county clerk, should be addressed.

The Missouri Board of Prison Inspectors, at Jefferson City, Mo., has approved plans for the construction of a $350,000 steel cell house and a $50,000 refrigerating plant. Work on structures and equipment is to begin as soon as contracts can be let.

The Evans-Cahn-Levitt Distilling Company, Kansas City, Mo., has been organized with $40,000 capital stock by A. S. Cahn, Alfred Evans, Joseph Levit and P. L. Olson to equip a distillery plant.

The Virgin Timer Company, Clio, Ark., has been incorporated with $600,000 capital stock by J. G. Bell, W. G. Lockwood and George H. Adams to equip saw mills and otherwise handle large lumber properties owned in that vicinity.

The Triangle Lumber Company, Clio, Ark., has been organized with $125,000 capital stock by A. B. Newman, Jacob Ringer, M. J. Stein, James H. Allen, M. F. Rutherford and B. J. Altneimer to equip saw mills on property owned by them.

The Tulsa Automobile & Mfg. Company, Tulsa, Okla., builder of commercial motor trucks, formerly the Dowagiac Motor Car Company, Dowagiac, Mich., now located in a new factory in the former city, is about to begin operations in the manufacture of 1000-lb. light delivery and one to three-ton trucks.

The building of a $100,000 power plant for the city of Loveland, Colo., has been authorized.

Texas

AUSTIN, TEX., February 17, 1912.

The planting season is now well advanced in south Texas and is rapidly being extended to other localities. With the coming of spring, industrial activities of all kinds show an improvement. Machinery dealers and building trades generally feel the beneficial effect of the opening up of spring activities. Irrigation development continues with unabated energy and more pumping machinery will be sold in Texas this season than any similar time in the history of the State.

The formal petition of land owners for the creation of what is to be known as the central irrigation district near Brownsville, Texas, has been presented to the County Commissioners' Court and will soon be favorably acted upon. The plans involve the installation of one or more large pumping plants and the construction of a system of canals and ditches that will afford a water supply for irrigating 63,300 acres of land. Bonds will be issued for the purpose of carrying out the project. D. P. Gay of Olmito and H. F. Stevenson of Brownsville are the chief promoters of the enterprise.

Tommie Bros. will erect a saw mill at Gist. The plant will have a capacity of 30,000 ft. of lumber a day.

M. L. Potash and associates have made application to the City Council of Victoria for a 50-year franchise for a gas plant and distributing system. They will begin their work of installation and construction as soon as the franchise is granted.

Thomas Hyslop is installing a new gin at Hutto.

Stephen Kirstinek has installed a new cotton gin at Caldwell.

The Yoakum Improvement Company is installing $5,000 worth of new equipment in its electric light and power plant at Yoakum. It is also making other improvements to its property.

The electric light plant at Miles, which was recently destroyed by fire, will be rebuilt and enlarged.

The San Benito Gin Company which has been formed at San Benito, will erect one of the largest cotton gin plants in the country. The equipment will consist of a 350-hp. water tube boiler, 16 all-steel Murray stand, and will have a capacity of 20 bales per hour.

The Creamery Dairy Company, San Antonio, will install a 50-ton ice factory at Yoakum.

The Del Rio Electric Light & Ice Company is installing a 30-ton ice plant at Del Rio.

H. Giesecke is installing an irrigation pumping plant on the Colorado River near Ballinger.

W. W. Farmer will enlarge his irrigation pumping plant and provide water for 500 acres of land near Ballinger.

Steps have been taken here to organize a sewer company to install a complete system of sewers for Midland. The estimated cost is $50,000. T. C. Carrington, secretary of the Commercial Club, is interested in the project.

John Ross, Timpton, Ohio, will put down several shallow wells upon his land near Plainview, Texas, and install a pumping plant upon each.

The Santa Tomas Coal Company has been formed at Laredo, with a capital stock of $140,000. It will install coal mining machinery and develop a large bed of coal near there. The incorporators are Albert Urbahn, M. T. Cogley and G. W. Durby, all of Laredo.

The City Council of Stephenville has let the contract to Berham & Kicker for boring two wells to provide a water supply for the proposed waterworks system that is to be installed. Bonds in the sum of $18,000 have been voted to put in the waterworks plant.

The City Council of Bowie is installing two air pumps, each with a capacity of 200 gal. a minute, at the deep wells of the municipal waterworks plant for the purpose of augmenting the water supply.

The Commercial Club of Tyler is promoting the establishment of a large mattress factory at that place.

George F. Hoedtke is installing a large creamery at Bowie. The municipal waterworks plant at Terrell is to be enlarged. The distributing system will be extended by the laying of 7000 ft. of new mains.

O. F. Scott will establish a factory at Gainesville for the manufacture of a circular stalk cutter which he recently invented.

It is announced by A. D. Bethard, vice-president and general manager of the Missouri, Kansas & Texas Railroad, that that company will soon begin the work of constructing extensive terminal improvements in East Waco. They will include the erection and equipment of shops, roundhouse, turn-table and a plant to separate lime from the water for use in locomotive boilers. The cost of these proposed improvements will be about $300,000.

The Knox Lumber Company of Bronson, Texas, is preparing to construct a railroad from Broadus, Texas, to Hemphill, a distance of about 25 miles. The proposed road will run through Bronson. The particular purpose of this road is to enable the utilization of a large trace of timber which the company owns.

The City Council of Cuero has under consideration the matter of ordering an election for the purpose of voting on the proposition of issuing bonds for the construction of a complete sewer system.

The J. P. Hesser Cement & Supply Company has been formed at Lubbock, with a capital stock of $5,000. I. M. Mullen and others are the incorporators.

J. M. Brooks, Boston, Mass., will construct a system of irrigation at a cost of about $300,000, to reclaim 28,000 acres of land which he owns near Fort Stockton, Texas. He will also establish a town upon the tract and make extensive industrial improvements.

C. C. Lewis is preparing to enlarge his ice plant at Carlsbad, N. M., from 5 tons to 15 tons daily capacity. He will also erect a cold-storage plant.

The Federal Light & Traction Company of New York has been investigating the situation at Deming, N. M., with a view of erecting a central electric power plant to furnish power for operating irrigation pumps throughout the Mimbres Valley. W. A. Haller, chief engineer of the company, will make a report upon the proposition, and if it is favorable the work of installing the plant will soon be started.

The city of Tucumcari, N. M., is considering plans for the enlargement of the electric light and power plant. A new building in which to house the equipment will be erected.

The Sonora Trading Company will erect a 75-barrel flour mill at Agua Prieta, Sonora, Mexico.

Lillywhite Bros. are preparing to erect a flour mill

at Colonia Morales, Sonora, Mexico, which will have a capacity of 75 barrels per day.

W. C. Wilson, of Hoban, formerly a member of the faculty of the State Agricultural and Mechanical College of Texas, is promoting the installation at Pecos, Tex., of a large central electric power plant and the construction of a system of transmission lines to provide power for operating irrigation pumps throughout that section.

Steps have been taken to lay a pipe line into Pecos to bring in water for manufacturing and industrial purposes. The plans involve the expenditure of about $100,000.

The Atchison, Topeka & Santa Fé Railroad has begun the reconstruction of its shops at Clovis, N. M. They will be larger than the old shops.

The Commissioners Court of Cameron County will be petitioned to create another irrigation district near Brownsville. The proposed district will comprise approximately 63,300 acres which has an assessed value of $432,911. Bonds will be issued to construct the drainage system.

Phillips & Phillips, of El Paso, recently made a proposition to the Ballinger Business League, which was accepted, to install a gas plant and distributing system at Ballinger. The work of constructing the enterprise will soon be started.

The Public Utilities Company, of Carlsbad, N. M., has let the contract for reconstructing the dam near there to the Pearson Construction Company at a cost of about $20,000. This dam will provide a water storage supply for generating initial power for electrical energy for the company.

The Pacific Coast

SAN FRANCISCO, CAL., February 13, 1912.

The machinery trade continues to improve, notwithstanding some delay in the placing of large orders. Figures are now being taken on a few fairly large machine tool deals, and still larger inquiries are expected within a few weeks, while small orders are coming out in better shape than for many months. There is a good general demand from the interior, and many local shops which have long been out of the market are beginning to buy on a moderate scale. A very fair movement is also noted at Los Angeles, and several large projects are talked of at that place, from which business may develop later on. Woodworking machinery has been particularly active in southern California for the last month, and the outlook there is considered promising. The woodworking business in San Francisco is only moderately active, but many improvements are being made to mills, box factories, etc., in northern California. Inquiries are beginning to come from many towns and counties for several lines of machinery, particularly road equipment and fire apparatus; a few machine tools also being purchased by the larger fire departments. A good many internal-combustion fire engines have been sold recently. Bids have been called for on the first grading work for the Panama-Pacific Exposition, and this work will from now on require considerable general contractors' equipment.

The Eureka Boiler Works, 57 Mission street, is moving to a new concrete building on Fremont, near Howard street.

The Natomas Consolidated of California has announced plans for a new reclamation and development project which will require a large amount of machinery. The plan includes a three-unit pumping plant, each unit of which, it is stated, will consist of an 800-hp. triple expansion engine connected to two 50-in. centrifugal pumps.

The Hanford Water Company, Hanford, Cal., will shortly install a new turbine pumping unit.

The East Shore & Suburban Railway, Richmond, Cal., is preparing to install a new 1500-kw. generator.

The city of Sacramento, Cal., is considering plans for reconstruction of the municipal waterworks, involving the installation of a new 150-hp. engine and pump.

The Fruit Growers' Supply Company is replacing steam power with electric motors in its large box factory, Hilt, Cal.

The Humboldt Cooperage Company, Arcata, Cal., has recently installed a number of new machines and electric motors.

The California Barrel Company, this city, has equipped all its machinery with devices for the prevention of accidents to employees.

The San Francisco office and store of the Joseph Dixon Crucible Company has been moved from 145 to 155 Second street.

The Mound House Plaster Company, which has just completed a large plaster and wall-board plant at Emeryville, Cal., plans to greatly increase the capacity of the plant before the end of the year.

The West Turlock Lumber & Mill Company, Turlock, Cal., is installing a lot of new woodworking machinery.

The Willett & Burr Company, railroad construction contractor, has purchased a tract near Decoto, Cal., for a permanent repair station.

The Turner Company, this city, is adding some new machines to its sheet metal working plant.

The Mission Marble Company, this city, will this spring install a quarry outfit near Wrangell, Alaska.

The Pacific Electric Railway, Los Angeles, is working on plans for large repair shops near that city.

It is reported that the Ford Motor Company, Detroit, Mich., plans to install a branch factory at Los Angeles.

G. A. Carley is working on an implement factory project at Modesto, Cal.

The Imperial Valley Oil & Cotton Company will put in a new cotton gin at Calexico, Cal., thus summer.

The town of Bakersfield, Cal., is in the market for a rock crusher and gravel handling machinery.

The demand for small pumping units for irrigation has increased greatly since the first of the year. The Geo. E. Dow Pumping Engine Company is extremely busy with this class of work at present, and is also working on a number of larger pumping outfits.

The Columbia Iron & Steel Company, Portland, Ore., has been organized for the purpose of erecting a blast furnace for the manufacture of pig iron and not a fabricating plant as was erroneously published in a recent issue of *The Iron Age*.

Eastern Canada

TORONTO, ONT., February 17, 1912.

The Prime Minister of Ontario announced on Monday that legislation would be introduced in the present session of the Assembly to authorize the Government to raise $5,000,000 for the developing of the northern portion of the province. This expenditure by the Government is sure to be the forerunner of a very great movement of enterprise in New Ontario on the part of private capital. Last week the Prime Minister of Quebec announced that his Government would borrow $10,000,000 to be re-loaned at half the interest rate to municipalities desiring it for the purpose of road making and road improvements. The Dominion Government has brought in legislation enabling it to give financial assistance to the provinces in road construction and improvement. It has also announced its purpose of giving financial aid to provinces for promoting agricultural progress. All the principal railway companies have large programmes of construction and expansion. These great spending bodies with their several projects stand, so to speak, at the head of the procession. Their outlays will start a movement all along the line. Manufacturers in all departments take a very hopeful view of the outlook and are having large actual prosperity.

With the view of meeting the increased demand for power the Electrical Development Company, Niagara Falls, is said to be about to commence extensive additions to its powerhouse and equipment. Four more units are to be installed, increasing the power development from 80,000 to 120,000 h.p., and the transmission line to Toronto will likely be duplicated. Altogether a sum of about $1,000,000 will be spent on the contemplated improvements.

The Standard Chemical Iron & Lumber Company, which has a large wood alcohol and charcoal plant in Parry Sound, Ont., has undertaken at once to begin the construction of a charcoal iron furnace there. By way of assisting the enterprise the ratepayers have just approved a by-law authorizing the town to lend the company $25,000 and to grant it a bonus of another $25,000.

Already there are signs of a big building year for Galt. The Goldie & McCullough Company, Ltd., will spend $80,000 increasing the plant of its machinery works and will also build a large addition to its boiler shops. On the new industrial sub-division, where manufacturing sites are given free, large plants will be built by the Victoria Wheel Works, Katie Foundry Company, Ltd., and the Canadian Motors, Ltd., the last named being nearly finished.

The Massey-Harris Company, Toronto, is erecting a foundry building between 300 and 400 ft. long. The company had to close down during the last week in January because the factory output had overtaken the shipping facilities and the warehouses were crowded. The enlargement of the warehouse capacity will be proceeded with as rapidly as possible on the new 10-acre lot acquired from the Ontario Government in the vicinity of the company's Toronto works.

A new paper mill to cost $1,000,000 is to be established near Thorold, Ont. The Township Council has passed a by-law on to the ratepayers for a vote on February 28 to fix a nominal assessment on 25 acres of land near the smelter. James Beattie is named as a trustee. An unnamed Chicago firm supplies the capital.

Fire damage amounting to between $15,000 and $20,000 was done to the works of the Owen Sound Wire Fence Company, Owen Sound, Ont., on February 10.

A permit has been granted for the construction in Toronto of a factory for the Canadian General Electric Company to cost $87,000.

The Canadian Safety Appliance Company, Port Colborne, Ont., has been granted a charter by the Dominion government to manufacture electrical appliances. The directors are L. J. and S. Shickluna, Port Colborne, and J. J. Shickluna, Buffalo, N. Y. L. J. Shickluna is manager.

Gasoelectric Motors, Ltd., St. Thomas, Ont., has been organized with a capital stock of $1,000,000 to manufacture motor cars driven by power which is generated on the machine from a gasoline engine. The provisional directors are E. H. Thomas, president; B. F. Honsinger, vice-president; H. F. Slater, Toronto, secretary-treasurer; H. C. Thomas and C. M. Preston, St. Thomas; J. F. Roland, Toronto; F. McKitching, St. Thomas.

The Canadian Crocker-Wheeler Company, St. Catherines, Ont., has had plans prepared for a structural steel erecting shop, 78 x 228 ft., of fire-proof construction. E. D. Pitt, Niagara Falls, Ont., is engineer in charge.

Western Canada

WINNIPEG, MAN., February 15, 1912.

Contractors are beginning to prepare for the opening of spring, when from present indications there will be much activity in building. As the season advances the outlook becomes more encouraging. Each week brings along new announcements relative to industrial expansion. Transportation conditions are still somewhat unsatisfactory, but there is some improvement over the situation in the previous weeks. Complaints of poor collections are heard, but as it is generally estimated that there are 60,000,000 bushels of wheat still to be hauled out of the country and marketed it is expected that money will be more plentiful in the rural districts before long.

Representing a company that has been engaged extensively in laying gas mains in the United States, John J. Corcoran, of the J. J. Corcoran Company, has been in Calgary in a personal effort to get the contract for the laying of the pipe line which will bring natural gas to Calgary from Bow Island, and to other towns which have given franchises to the Western Canada Natural Gas, Heat, Light & Power Company. This is one of the biggest undertakings of its kind ever arranged for in Canada.

J. A. Brockelsby, of Toronto, representing eastern capitalists, is understood to have purchased a site at Lynn Creek, Vancouver, B. C., on which to put up a large tannery.

The Union Supply Company, Rosthern, Sask., has decided to rebuild the flour mill burned there a short time ago. The capacity of the new plant will be 250 barrels.

The sash and door factory of the McCormick Mfg. Company, St. Boniface, Man., was burned a few days ago, with a loss of about $25,000. The plant will be rebuilt.

The Winnipeg Steel Granary & Culvert Company has decided to rebuild the plant at St. Boniface, Man., which was burned a few weeks ago. The capacity will be larger than before and the machinery will have to be replaced.

Chipman & Powers, engineers, Toronto and Winnipeg, have been appointed to prepare plans for the enlargement of the electric lighting plant at North Battleford, Sask.

It is expected that a bylaw will be submitted to the rate-payers of Calgary to give fixed taxation to the Canada Malting Company. Plans embrace elevator and malting plant, the total cost being placed at $250,000.

R. O. Roberts, waterworks expert, in his final report of the Regina, Sask., water supply, recommends several sources to meet the present and future requirements, capable of supplying 7,000,000 gal., at an estimated cost of $1,106,000. L. A. Thorton is the city engineer.

A company said to be an off-shoot of the International Construction Company, Winnipeg, will establish a plant at Saskatoon, Sask., for the manufacture of fire-proof partitions and flooring.

Up to March 11 tenders will be received by the Town Clerk of Burnaby, B. C., for the supplying of 35 miles of steel pipe of sizes varying from 3 to 10 in. in diameter.

Sealed tenders, addressed to the City Commissioners, Saskatoon, Sask., and endorsed "Tender for Electrical Machinery," will be received up to twelve o'clock March 8 for the following apparatus: five 500 B.H.P. water tube boilers, five sets of automatic stokers, induced draft plant and duplicate plans for same, economizers for 2000 h.p. capacity, two feed pumps and all necessary equipment for the above, one 2000-k.w. high pressure steam turbine with condenser, air pumps and necessary equipment, two 75-k.w. turbine exciters, one generator panel, two exciter panels with all necessary cables and apparatus from turbine to switchboard.

Wood, Vallance & Adams, Hamilton, Ont., hardware merchants, are contemplating the erection of a four-story warehouse in Calgary, Alberta, to cost $50,000.

The Ontario Wind Engine & Pump Company, Ltd., contemplates erecting a warehouse to cost $50,000 in Calgary, Alberta.

The B. C. Iron, Wire & Fence Company, Vancouver, B. C., expects to be in the market soon for a combined punch and shear large enough to punch a 1-in. hole in ⅝-in. iron and to shear ⅝-in. iron and to have at least a 6-in. throat or open space. The company also expects to buy a small shaper and medium sized lathe, both suitable for its ornamental iron works.

Government Purchases

WASHINGTON, D. C., February 19, 1912.

The Paymaster General, Navy Department, Washington, will open bids March 19, under schedule 4342, for one portable motor-driven lathe for delivery to Puget Sound.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids March 19, under schedule 4362, for one sash door mortising machine for delivery to Norfolk, Va.

The Department of Commerce and Labor, light house service, third district, Tompkinsville, N. Y., will open bids March 1 for delivering at Tompkinsville two belt driven air compressors.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids February 13 for material and supplies for the navy yards as follows:

Schedule 4251, class 22, one steam capstan.—Bidder 6, American Engineering Company, Philadelphia, Pa., $990; 87, Hyde Windlass Company, Bath, Me., $620.

Class 23, one combined steam and hand steering engine.—Bidder 6, American Engineering Company, Philadelphia, Pa., $4,660; 87, Hyde Windlass Company, Bath, Me., $3,881; 106, Lidgerwood Mfg. Company, New York, $4,972 and $5,094.76.

Schedule 4263, class 32, one gate shear.—Bidder 16, Bethlehem Steel Company South Bethlehem, Pa., $8,566; 44, Cleveland Punch & Shear Works, Cleveland, Ohio, $4,600; 66, Prevert Machinery Company, New York, $4,950; 82, Hilles & Jones Company, Wilmington, Del., $4,068; 140, Niles-Bement-Pond Company, New York, $5,000; 207, Wickes Bros., Saginaw, Mich., $5,989.

Class 33, one 6-hp. hydraulic riveter.—Bidder 16, Bethlehem Steel Company, South Bethlehem, Pa., $4,100; 27, Camden Iron Works, Camden, N. J., $2,205; 127, Manning, Maxwell & Moore, New York, $3,328; 210, William H. Wood, Media, Pa., $3,750.

Class 34, one motor driven tube-cutting-off machine.—Bidder 105, Kemp Machinery Company, Baltimore, Md., $415; 127, Manning, Maxwell & Moore, New York, $446, $668, $396 and $638; 140, Niles-Bement-Pond Company, New York, $800.

Schedule 4285, class 41, two geared pneumatic hoists.—Bidder 31, Chicago Pneumatic Tool Company, New York, $513; 47, Detroit Hoisting Machine Company, Detroit, Mich., $270 and $250, alternate; 96, Ingersoll-Rand Company, New York, $266; 172, South Norwalk Engineering Company, South Norwalk, Conn., $269.

The Commissioners of the District of Columbia, Washington, opened bids February 14 for furnishing and erecting six motor head speed lathes in the Armstrong Manual Training School as follows: Oliver Machinery Company, New York, $936; Manning, Maxwell & Moore, Inc., New York, $952.12.

Current Metal Prices.

The following quotations are for small lots. New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly report.

IRON AND STEEL—

Bar Iron from Store—

Refined Iron:
1 to 1⅝ in. round and square ... ₱ lb 1.70¢
1½ to 4 in. x ⅜ to 1 in. ... ₱ lb 1.70¢
1½ to 4 in. x ¼ to 5-1 ... ₱ lb 1.80¢
Rods—⅝ and 11-16 round and square. ₱ lb 1.80¢
Angles: Cts. ₱ lb.
3 in. x ¼ in. and larger ... 1.80¢
3 in. x 3-16 in. and ⅛ in. ... 2.20¢
1½ to 2½ in. x ⅛ in. ... 1.95¢
1½ to 2¾ in. x 3-16 in. and thicker ... 1.85¢
1 to 1¼ in. x 3-16 in. ... 1.95¢
1 to 1¼ x ⅛ in. ... 2.00¢
⅞ x ⅛ in. ... 2.10¢
¾ x ⅛ in. ... 2.15¢
⅝ in. x ⅛ in. ... 3.35¢
⅛ x 3-32 in. ... 4.40¢
Tees:
1 in. ... 2.25¢
1¼ in. ... 2.10¢
1½ to 2½ x ¼ in. ... 1.90¢
1½ to 2½ x 3-16 in. ... 2.00¢
3 in. and larger ... 1.85¢
Beams ... 1.80¢
Channels, 3 in. and larger ... 1.80¢
Bands—1½ to 6 x 6-16 to No. 8 ... 2.00¢
Burden's "H. B. & S." Iron, base price ... 2.95¢
"Burden's Best" Iron, base price ... 3.15¢
Norway Bars ... 3.60¢

Merchant Steel from Store—

₱ lb.
Bessemer Machinery ... 1.70¢
Toe Calk, Tire and Sleigh Shoe ... 2.50@3.00¢
Best Cast Steel, base price in small lots ... 7¢

Sheets from Store—

Black

	One Pass, Soft Steel.	R. G. Cleaned
No. 16	₱ lb 2.40¢	2.95¢
Nos. 18 to 20	₱ lb 2.45¢	3.05¢
Nos. 22 and 24	₱ lb 2.50¢	3.15¢
No. 26	₱ lb 2.55¢	3.25¢
No. 28	₱ lb 2.65¢	3.45¢

Russia, Planished, &c.

Genuine Russia, according to assortment ... ₱ lb 12 @ 14½
Patent Planished, W. Dewees Wood, ... ₱ lb A. 10¢; B. 9¢ net

Galvanized

Nos. 12 and 14 ... ₱ lb 2.75¢
No. 24 ... ₱ lb 3.10¢
No. 26 ... ₱ lb 3.30¢
No. 28 ... ₱ lb 3.60¢
No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized
Nos. 22 and 24 ... ₱ lb 5.50¢
No. 26 ... ₱ lb 6.00¢
No. 28 ... ₱ lb 7.00¢

Corrugated Roofing—

2½ in. corrugated.	Painted.	Galvd.
No. 24 ... ₱ 100 sq. ft.	$3.75	$4.70
No. 26 ... ₱ 100 sq. ft.	2.85	3.90
No. 28 ... ₱ 100 sq. ft.	2.50	3.65

Tin Plates—

American Charcoal Plates (Per Box)
AAA Charcoal:
IC, 14 x 20 ... $6.35
IX, 14 x 20 ... 7.60
A Charcoal:
IC, 14 x 20 ... $5.30
IX, 14 x 20 ... 5.40

American Coke Plates—Bessemer—
IC, 14 x 20 ... 107 lb. ... $4.20
IX, 14 x 20 ... 5.20

American Terne Plates—
IC, 20 x 28 with an 8 lb coating ... $8.10
IX, 20 x 28 with an 8 lb coating ... 10.10

Seamless Brass Tubes—

List November 13, 1908 ... Base price, 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908 ... Base price, 18¢

Copper Tubes—

List November 13, 1908 ... Base price, 21¢

Brazed Brass Tubes—

List February 1, 1911. 20¾¢ ₱ lb

High Brass Rods—

List February 1, 1911. 15¾¢ ₱ lb

Roll and Sheet Brass—

List February 1, 1911. 16¢ ₱ lb

Brass Wire—

List February 1, 1911. 15¾¢ ₱ lb

Copper Wire—

Base Price, Carload lots mill 15¼¢

Copper Sheets—

Sheet Copper Hot Rolled, 16 oz. (quantity lots) ... ₱ lb 19¢
Sheet Copper Cold Rolled, 1¢ ₱ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₱ square foot.
Sheet Copper Polished over 20 in. wide, 2¢ ₱ square foot.
Planished Copper, 1¢ ₱ square foot more than Polished.
Tinning, one side, 3½¢ ₱ square foot.

METALS—

Tin—

Straits Pig ... ₱ lb 47¢ @48 ¢

Copper—

Lake Ingot ... ₱ lb 15¼@16¼¢
Electrolytic ... ₱ lb 15¼@15¾¢
Casting ... ₱ lb 15 @15⅜¢

Spelter—

Western ... ₱ lb 7⅛@7⅜

Zinc—

No. 9, base, casks ... ₱ lb 8¾¢. Open, ₱ lb 9¼¢

Lead—

American Pig ... ₱ lb 5¼@5¾¢
Bar ... ₱ lb 6¾@7 ¢

Solder—

½ & ½ guaranteed ... ₱ lb 27½@28 ¢
No. 1 ... ₱ lb 25½@26 ¢
Refined ... ₱ lb 23 @23½¢
Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ... ₱ lb. @16½¢
Hallets ... @10 ¢
Other Brands ... 9@ 9½¢

Bismuth—

Per lb ... $2.00@$2.25

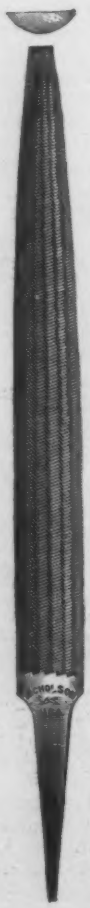
Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting (ton lots) 19¼¢
Rods & Wire ... Base Price 31¢
Sheets ... Base Price 33¢

Old Metals—

Dealers' Purchasing Prices Paid in New York.

Copper, heavy and crucible ... 12.25
Copper, heavy and wire ... 12.00
Copper, light and bottoms ... 11.00
Brass, heavy ... 8.50
Brass, light ... 6.50
Heavy machine composition ... 10.50
Clean brass turnings ... 8.00
Composition turnings ... 9.00
Lead, heavy ... 3.75
Lead, tea ... 3.25
Zinc, scrap ... 4.75



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It has seemed to some men that the files used in their shops were of little productive importance, but

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Stroke for stroke they cut faster and cleaner than any others. File for file they last longer in a condition fit for hard service.

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Providence, Rhode Island, U. S. A.